INTEGRA
MICROWAVE

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INTEGRA MICROWAVE

MODEL MSG-2106

MICROWAVE SWEEPER

OPERATION & SERVICE MANUAL

WARRANTY

Integra warrants this instrument to be free from defects in material and workmanship for one year from the date of delivery. Damage due to accident, abuse or improper operation, is not covered by the warranty. Removal, defacement, or alteration of any serial or inspection label, marking or seal, may void the warranty. Integra will repair or replace at its option, any components of this instrument which prove to be defective during the warranty period, provided the entire instrument is returned prepaid to Integra or its authorized service facility.

In-warranty instruments will be returned freight prepaid; out of warranty units will be returned freight collect. No other warranty other than the above warranty is expressed or implied. Integra is not liable for consequential damages.

ASSISTANCE

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1. GENERAL INFORMATION

1.1 INTRODUCTION

This Operating Manual contains information required to install and operate the INTEGRA MICROWAVE MODEL 2100 SERIES MICROWAVE SWEEP GENERATORS. The MSG-2100 Series provides coverage from .01 to 40 GHz. The frequency coverage of each generaator is identified by its model number, and specifications for each model are located in the front section of this manual.

1.2 DESCRIPTION

The key to the MSG-2100's performance is a YIG-tuned oscillator designed for maximum tuning range and high output power. The high Q YIG resonator gives a signal with high spectral purity and very good tuning linearity..

The instruments feature four different internal sweep modes: F1-F2, M1-M2, delta F, Full Sweep and CW operation. The sweep frequency can be continuously adjusted over a .01 to 100 second sweep time. Four different trigger modes: internal, external, line and single are provided. A manual sweep function is also included.

With three independently adjustable markers, the frequencies of any three points in the sweep can be easily identified. Each marker frequency can be read out on the digital frequency readout. Each marker provides a pulse on the Z-axis output which gives an intensity marker when applied to the scope's Z-axis.

The MSG-2100 series provides an input for frequency modulation or frequency/phase-lock of the RF signal.

Three calibrated digital readouts display START/STOP frequencies, marker frequencies, center frequency, and Delta F width, simplifying operation.

IEEE-488 Bus interface and BCD programming is available as an option.

SPECIFICATIONS MSG-2110

FREQ. RANGE (GHz)..... 2-26.5 GHZ
OUTPUT POWER, LEVELED..... +10 dBm, 2-18 GHZ
..... + 3 dBm, 18-26.5 GHZ
FLATNESS (with internal leveling)..... ±1.4 dB

SPURIOUS SIGNALS
Harmonics..... -20 dBc
Non-harmonics..... -50 dBc

ACCURACY..... ±0.3%

STABILITY
WITH TEMP..... <±0.05%
WITH 10% LINE CHANGE..... <±0.001%
WITH 3:1 SWR..... <±0.05%

SWEEP MODE
F1-F2 SWEEP.....Sweeps between any two frequencies set by F1 and F2 controls. M1 and M2 controls provide markers.
M1-M2 SWEEP.....Sweeps between any two frequencies set by M1 and M2 controls.
CW-MODE.....Continuously variable single frequency, controlled by Fo control and Fo vernier.
DELTA-F SWEEP....Sweeps symmetrical around Fo setting. Sweep width is determined by Delta-F control
FULL SWEEP.....Sweeps the full band.

FREQUENCY MARKER...Three independent frequency markers: M1, Mo and M2. Available at Z-axis output and at marker pulse output (rear panel).

SWEEP RATES.....0.05 to 100 second/sweep continuously adjustable.

SWEEP INDICATOR.... LED indicates sweep, except manual.

TRIGGER MODES
LINE.....Start of sweep is synchronized with the line frequency.
INT.....Sweep recurs automatically.
EXT.....Sweep is actuated by an externally applied signal >+2V peak, >1/2 micro sec pulsewidth and 1.0 MHz repetition rate max. Signal applied to Ext. Trigger input at the rear BNC connector.
SINGLE.....Single sweep is actuated by front panel switch (Single).

MODE
  AUTO.....Sweep recurs automatically controlled by sweep
           frequency and sweep trigger source.
  EXT..(External)..
    LOCAL.....Range may be swept by external sweep voltage source
              of zero to +10 V dc (sweep between F1 and F2 setting).
    REMOTE.....Controlled by IEEE-488 Bus (Optional).

  MAN.....Sweep controlled by manual sweep control.

FREQUENCY READOUT
  READOUT TYPE..... 4 digit, light-emitting diodes.
  NUMBER OF READOUTS... 3
  READOUT RESOLUTION... 10 MHZ
    READOUT UPDATE..... Once every sweep (250ms, min)

READOUT FUNCTIONS
    F1-F2 MODE.....Readout of F1, Mo, F2, or M1, Delta-M,
                   M2 depending on display selector.
    M1-M2 MODE.....Readout of M1, Mo and M2
    CW MODE.....Display of Fo
    DELTA-F MODE...Display of Fo and Delta-F
    FULL SWEEP.....Display of M1, Mo and M2
    MAN. SWEEP.....Display of Fo
    EXT. SWEEP.....Display of Fo
DISPLAY SELECTOR...Selects display of F1, Mo, F2 or M1,
                   Delta M, M2 in F1-F2 mode only.

EXTERNAL FM
  BANDWIDTH.....DC to 100 kHz, ±2dB response for
                 20 MHz deviation.
  SENSITIVITY.....10 MHz/volt.
  INPUT IMPEDANCE..>1 kOhm, DC-coupled wideband input for FM
                   and Phase-Lock applications.

RESIDUAL FM.....<50kHz, CW mode (Filter Capacitor IN).

OUTPUTS
  SWEEP OUTPUT.... 0 to +10 V
  Z-AXIS/PEN LIFT. Contains pos. blanking (+5V) and negative
                   intensity marker pulses (-5V). Pen lift
                   in 10 to 100 sec. sweep range. Display
                   Blanking On-Off Switch.
  INVERTED Z-AXIS..Blanking (-5V) and Markers (+5V).

  MARKER OUTPUT... Pos. marker pulses (TTL-Level)
  NEGATIVE BLANKING OUTPUT..... -2 V pulse
  ANALOG"OUTPUT... 0.1V/GHz proportional to frequency range.

TEMPERATURE RANGE..... +10 to +40 C
SIZE(WxHxD)..... 19x 5 1/4x 17 inches
WEIGHT..... 38 lbs.
POWER..... 115/220VAC, 50-60HZ

OPTIONS

OPTION-02.....IEEE 488 Interface (GPIB) frequency programming. Provides 10,000 points in any Sweep Mode selected via front panel Sweep Mode Switch. START/STOP frequency determined by F1-F2, M1-M2 or Full Band.
*Local/Remote (Auto/Ext Mode)switch and LED for 488 control.
*Oscillator filter capacitor (IN/OUT) can be selected via Bus control.

OPTION-03.....Internal and External Leveling.

1.3 SPECIFICATIONS

	MSG-2106
FREQ. RANGE	2-18.5 GHz
OUTPUT POWER, LEVELED	+10 dBm
FLATNESS (with internal leveling)	±1 dB
SPURIOUS SIGNALS	
Harmonics	-20 dBc
Non-harmonics	-50 dBc
ACCURACY	±0.3%
STABILITY	
WITH TEMP	<±0.05%
WITH 10% LINE CHANGE	<±0.001%
WITH 3:1 SWR	<±0.05%

SWEEP MODE

- F1-F2 SWEEP.....Sweeps between any two frequencies set by F1 and F2 controls. M1 and M2 controls provide markers.
- M1-M2 SWEEP.....Sweeps between any two frequencies set by M1 and M2 controls.
- CW-MODE.....Continuously variable single frequency, controlled by Fo control and Fo vernier.
- DELTA-F SWEEP....Sweeps symmetrical around Fo setting. Sweep width is determined by Delta-F control.
- FULL SWEEP.....Sweeps the full band.

FREQUENCY MARKER...Three independent frequency markers: M1, Mo and M2. Available at Z-axis output and at marker pulse output (rear panel).

SWEEP RATES..... 0.03 to 100 second/sweep continuously adjustable.

TRIGGER MODES

- LINE.....Start of sweep is synchronized with the line frequency.
- INT.....Sweep recurs automatically.
- EXT.....Sweep is actuated by an externally applied signal >+2V peak, >1/2 micro sec pulsewidth and 1.0 MHz repetition rate max. Signal applied to Ext. Trigger input at the rear BNC connector.
- SINGLE.....Single sweep is actuated by front panel switch (Single).

MODE
  AUTO.....Sweep recurs automatically controlled by sweep
           frequency and sweep trigger source.
  EXT..(External)..
    LOCAL.....Range may be swept by external sweep voltage source
              of zero to +10 V dc (sweep between F1 and F2 setting).
    REMOTE.....Controlled by IEEE-488 Bus (Optional)

  MAN.....Sweep controlled by manual sweep control.

FREQUENCY READOUT
  READOUT TYPE..... 4 digit, light-emitting diodes.
  NUMBER OF READOUTS... 3
  READOUT RESOLUTION... 10 MHZ

READOUT FUNCTIONS
    F1-F2 MODE.....Readout of F1, Mo, F2, or M1, Delta M,
                   M2 depending on display selector.
    M1-M2 MODE.....Readout of M1, Mo and M2
    CW MODE.....Display of Fo
    DELTA F MODE...Display of Fo and Delta F
    FULL SWEEP.....Display of M1, Mo and M2
    MAN. SWEEP.....Display of Fo
    EXT. SWEEP.....Display of Fo
DISPLAY SELECTOR...Selects display of F1, Mo, F2 or M1,
                   Delta M, M2 in F1-F2 mode only.

EXTERNAL FM
  BANDWIDTH..... DC to 100 kHz, ±2dB response for
                  20 MHz deviation.
  SENSITIVITY..... 10 MHz/volt.
  INPUT IMPEDANCE. >1 kOhm, DC-coupled wideband input for FM
                   and Phase-Lock applications.

RESIDUAL FM.....<50kHz, CW mode (Filter Capacitor IN).

OUTPUTS
  SWEEP OUTPUT.....0 to +10 V
  Z-AXIS/PEN LIFT..Contains pos. blanking (+5V) and negative
                   intensity marker pulses (-5V). Pen lift
                   in 10 to 100 sec. sweep range. Display
                   Blanking On-Off Switch.
  INVERTED Z-AXIS..Blanking (-5V) and Markers (+5V).
  MARKER OUTPUT....Pos. marker pulses (TTL-Level)
  NEGATIVE BLANKING OUTPUT..... -2 V pulse
  ANALOG OUTPUT... 1V/GHz proportional to frequency range.

INPUTS
  EXT. TRIGGER.....See EXT. TRIGGER MODE
  EXT. SWEEP.....See EXT. MODE

TEMPERATURE RANGE..... +10 to +40 C
SIZE(WxHxD)..... 19x 5 1/4x 17 inches
WEIGHT..... 38 lbs.
POWER..... 115/220VAC, 50-60HZ

OPTIONS

Option-02....IEEE-488 Interface (GPIB) frequency programming. Provides 10,000 points in any Sweep Mode selected via front panel Mode Switch. START/STOP frequency determined by F1-F2, M1-M2, Full Band, or Delta-F. Source filter capacitor (IN/OUT) can also be selected via Bus control.

OPTION-03.....Internal and External Leveling

Option-07A...RF Level Control (10dB range) via 488 Bus. (Requires option-02)

2. OPERATION

2.1 GENERAL

The Series MSG-2100 Microwave Sweep Generators are designed to give the operator an optimum of convenience, versatility, and state of the art performance. All operating controls are set-up to be self-explanatory and reduce operator training and operating errors to a minimum.

This section covers all the front and rear panel features as well as typical operating set-ups.

2.2 FRONT PANEL FEATURES

Figure 1 shows all the front panel controls which are common to the standard unit as well as the units with Internal and External Leveling Option.

The additional controls associated with the leveling option are also shown in Fig. 2.

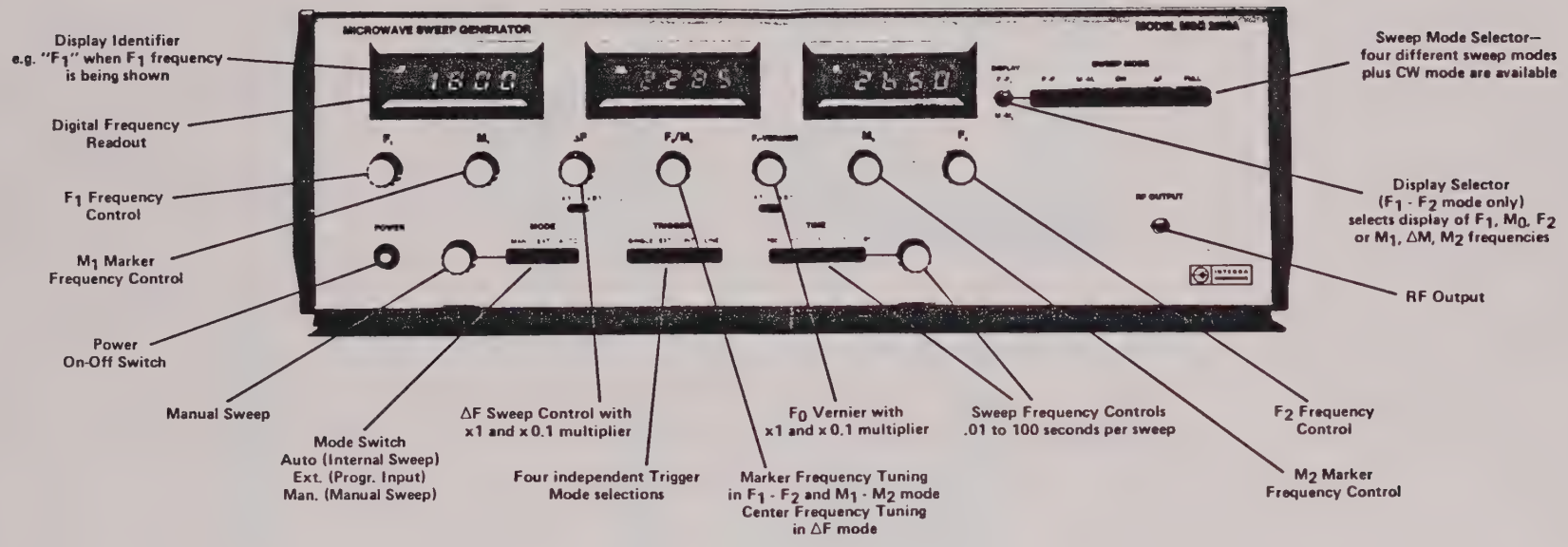


FIG 1

FRONT PANEL FEATURES

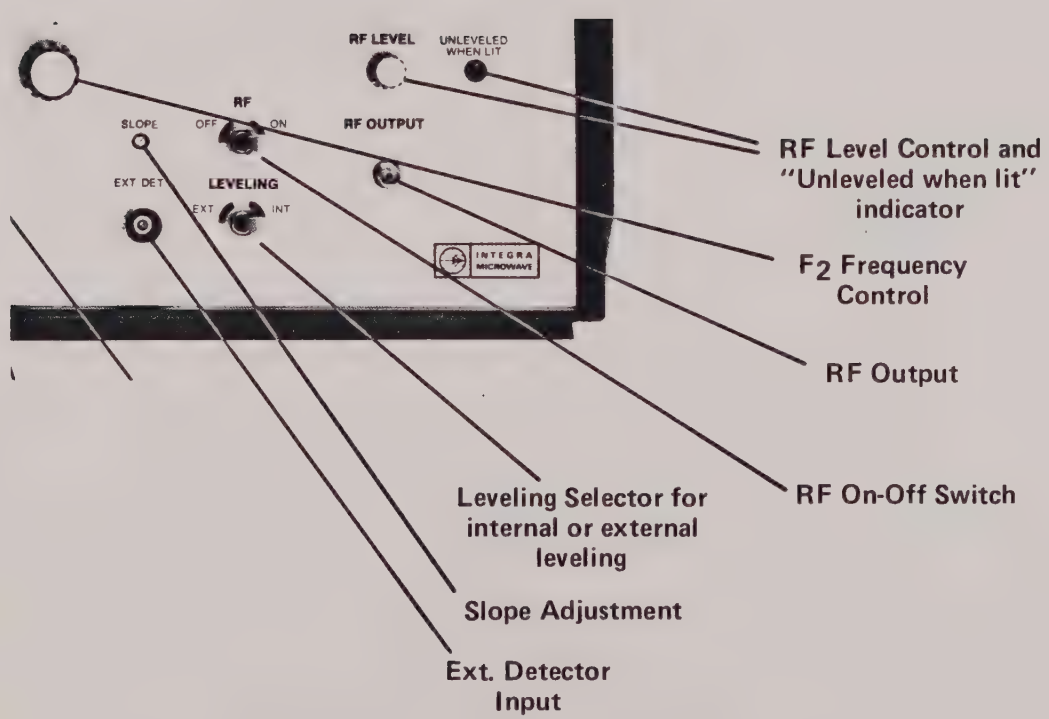


FIG. 2

OPTION 05 : INT. & EXT. LEVELING CONTROLS

2.3 REAR PANEL FEATURES (Figure 2)

Figure 3 shows the rear panel connections.

The signal description of the individual inputs and outputs can be found in section 1.3 specifications.

2.3 REAR PANEL FEATURES

Fig. 3 shows the rear panel connections.

The signal description of the individual inputs and outputs can be found in section 1.2 specifications.

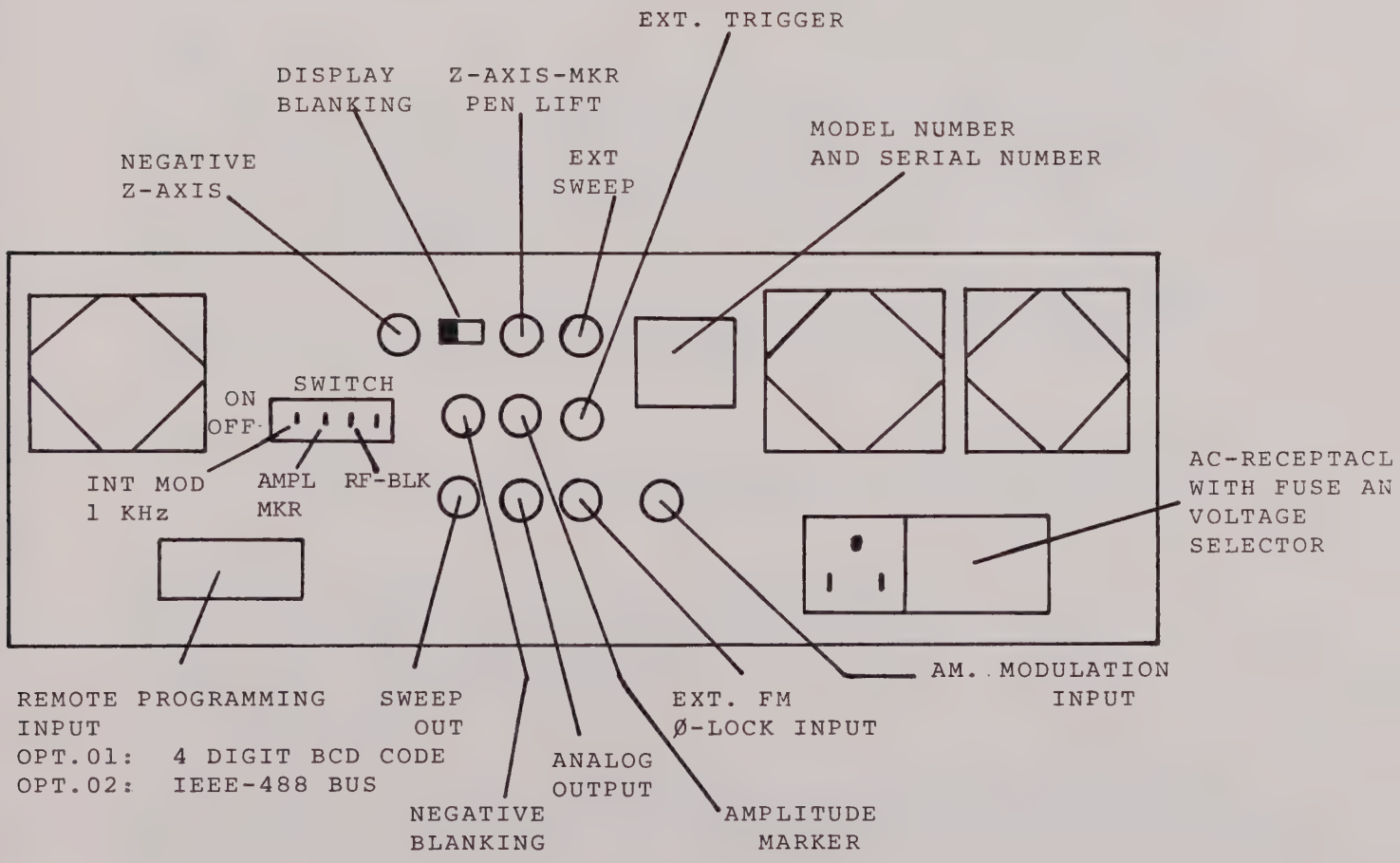


FIG. 3

REAR PANEL CONNECTIONS

2.4 TYPICAL OPERATIONAL SET-UP

This section covers typical set-up and operating modes of the MSG-2100 series microwave sweep generators.

SET-UP (Figure 3)

The Microwave Sweep Generator should be connected to a scope as indicated in figure 3.

HORIZ. SWEEP

The SWEEP OUT of the MSG-2100 (o to +10 V) should be connected to the horizontal input of the scope (DC-coupled input required). The gain of the horizontal section should be adjusted for a full CRT sweep.

Z-AXIS

The Z-AXIS output of the MSG-2100 should be connected to the Z-AXIS input of the scope for display blanking during retrace and for the intensity markers during normal sweep. The MSG-2100 has both polarities (Z-AXIS-MKR-PEN LIFT and INVERTED Z-AXIS OUTPUT) in order to accommodate scopes with either polarity required for blanking on the Z-AXIS.

If a scope with out a Z-AXIS input must be used the AMPL. MARKER output can be summed with the vertical input (second channel on scope) in order to display the markers.

DETECTED SIGNAL

The RF detector should be connected to the vertical input of the scope in order to display the amplitude.

MSG-2100 SET-UP :
SELECT AUTO on MODE switch for internal sweep.
SELECT SWEEP TIME e.g.; .1 to .01 and use vernier control.
SELECT TRIGGER for internal sweep, e.g.; INT.
SELECT SWEEP MODE e.g.; F1-F2

F1-F2 SWEEP MODE

In the F1-F2 Sweep Mode the DISPLAY selector allows to display F1, M0, F2 when set on F1-F2 and will display M1, Delta M, M2 when set to M1-M2.

Fig. 3 shows a typical display set-up.

This operating mode is very convenient when taking bandwidth data. The markers M1 and M2 can be set to the desired points and the absolute frequencies and the bandwidth Delta M can be readout directly.

M1-M2 SWEEP MODE

SELECT M1-M2 SWEEP MODE and the selected M1 and M2 frequencies become the end points of the sweep. The displays indicate the M1, M2, and M0 marker frequencies

CW-MODE

SELECT CW-MODE and the internal sweep is stopped. The CW-frequency can be controlled over full band by the F0 control and F0 vernier with x1 and x0.1 multiplier. The display only shows the F0 frequency.

DELTA F-MODE

In Delta F mode the center frequency is controlled by the F0 control and F0 vernier with x1 and x0.1 multiplier. The F0 control operates between the F1 and F2 setting. If necessary the F1 and F2 limits should be set wider. The Delta F control and its x1 and x0.1 multiplier controls the Delta F sweep width. The Delta F sweep is symmetrical around F0 and the end points are F0 + Delta F/2 and F0 - Delta F/2. The displays show F0 and Delta F.

FULL-MODE

In FULL-MODE the instrument sweeps over its entire range (e.g.; 2-18.5 GHz) and the F1 and F2 controls have no influence. All 3 markers are available and are also displayed by the digital frequency readouts.

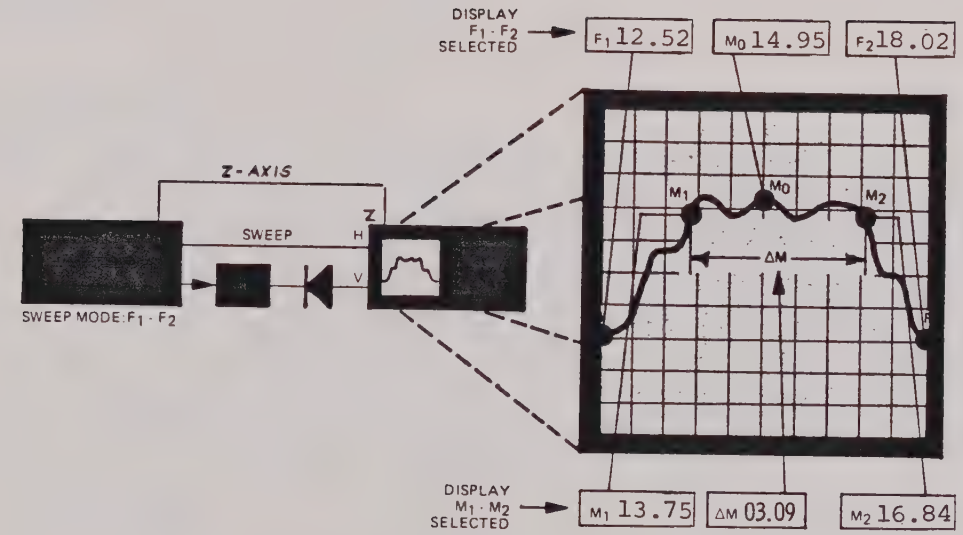


FIG. 4

F_1-F_2 - SWEEP MODE SETUP

3.0 OPERATING MODES

FULL SWEEP MODE (Figure 4)

The SWEEP GENERATOR provides a sweep voltage which is clamped by the clamp circuit and then amplified to 0 to +10 V. This voltage is applied to the linearizer (optional) when in FULL mode and then converted to a suitable drive current by the YIG Driver.

SET-UP CONDITION:

SWEEP MODE	FULL
MODE	AUTO
TRIGGER	ANY

F1-F2 SWEEP-MODE (Figure 5)

The SWEEP GENERATOR provides an output signal which is clamped on the top and bottom by the CLAMP circuit and then amplified to 0 to +10 V. In the F1-F2 mode, this voltage is applied to the DUAL FUNCTION CONTROLLER which sets the F1 and F2 of the frequency sweep range. The start of the sweep frequency F1 can be adjusted independent of F2 (stop frequency), and F2 is independent of F1. This drive voltage passes through the linearizer (optional) and is then converted to a drive current in the YIG driver. The YIG oscillator generates an output frequency proportional to the drive current. The Analog Output Amplifier scales the drive voltage to be proportional to output frequency (volts/GHz).

SET-UP CONDITION:

SWEEP MODE.....	F1-F2
MODE	AUTO
TRIGGER.....	ANY

M1-M2 SWEEP-MODE (Figure 6)

The SWEEP GENERATOR provides an output signal which is clamped on the top and bottom by the CLAMP circuit and then amplified to 0 to +10 V. In the M1-M2 mode, this voltage is applied to the DUAL FUNCTION CONTROLLER which sets the M1 and M2 of the frequency sweep range. The start of the sweep frequency M1 can be adjusted independent of M2 (stop frequency), and M2 is independent of M1. This drive voltage passes through the linearizer (optional) and is then converted to a drive current in the YIG driver. The YIG oscillator generates an output frequency proportional to the drive current. The Analog Output Amplifier scales the drive voltage to be proportional to output frequency (volts/GHz).

SET-UP CONDITION:

SWEEP MODE.....	M1-M2
MODE.....	AUTO
TRIGGER.....	ANY

CW-MODE(Figure 7)

The Dual Function Controller generates a 0 to +10 V which is controlled by the F0/M0 control and the F0/M0 vernier control. The range of the F0/M0 vernier control can further be controlled by the x1 and x0.1 range switch. If the system is not in external mode, and CW is selected, then the 0 to +10 V is applied through the linearizer (optional) to the YIG Driver. The YIG Driver converts the drive voltage to a current in order to drive the YIG-OSC. In the CW mode, a noise reduction capacitor is placed across the YIG drive coil.

SET-UP CONDITION:
SWEEP MODE ..... CW
MODE ..... AUTO

DELTA F MODE (Figure 8)

The Dual Function Controller generates a 0 to +10 V signal controlled by the F0/M0 control and the Fo-Vernier with its associated range switch. This voltage controls the center frequency. The end limits of the center frequency range is set by the F1 and F2 controls. The sweep generator delivers a 0 to +10 V sweep signal to the delta F amplifier which adds an offset and delta F control. The output of the delta F amplifier is 0 to + OR -5 V depending on the delta F setting. This signal is summed together with the center frequency controlling voltage in the dual function controller. This gives a symmetrical sweep around the center frequency F0. This signal is then applied through the linearizer (optional) to the YIG driver which converts this voltage into a suitable drive current for the YIG-OSC.

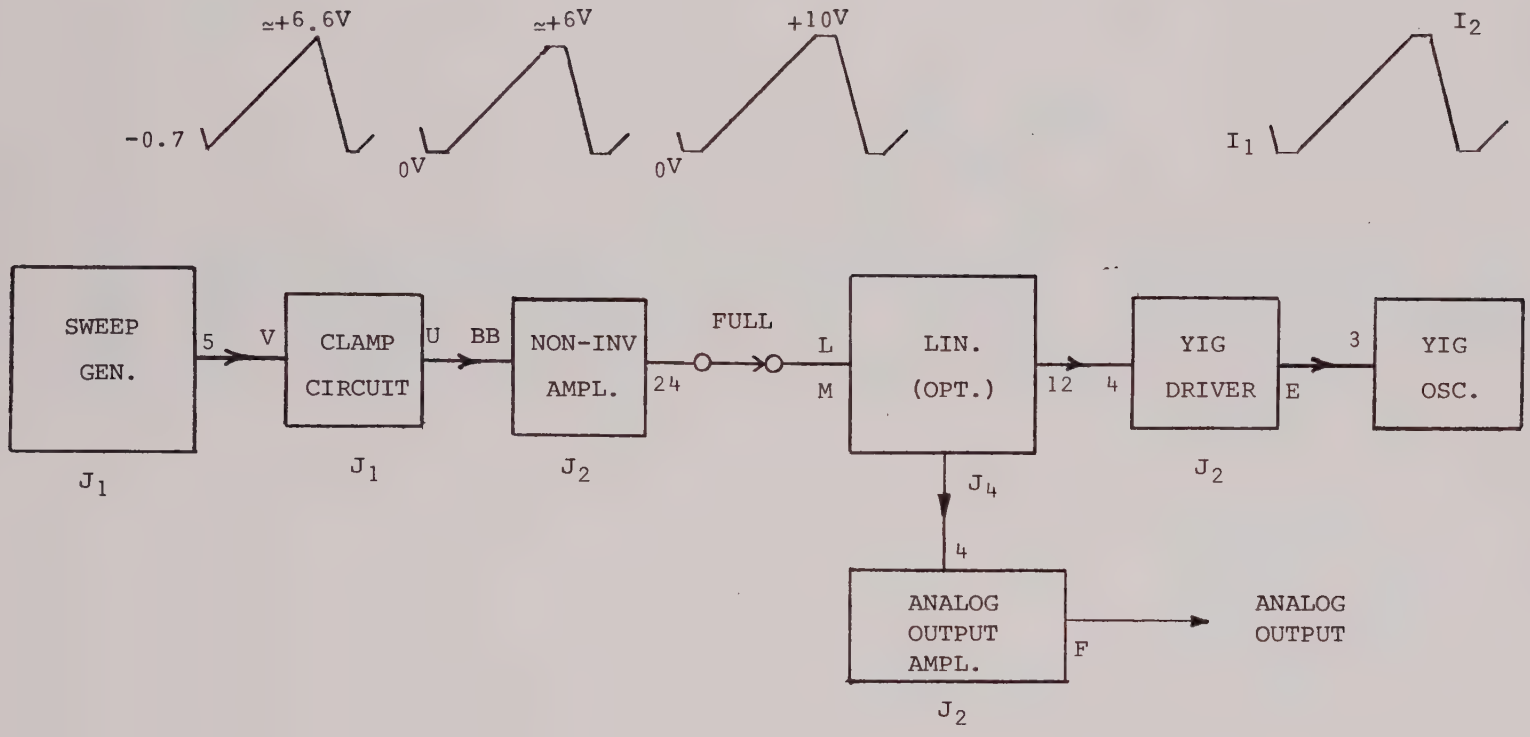
SET-UP CONDITION:
SWEEP MODE ..... DELTA F
MODE ..... AUTO
TRIGGER ..... ANY
TIME ..... ANY

LOCAL/REMOTE (Option-02)

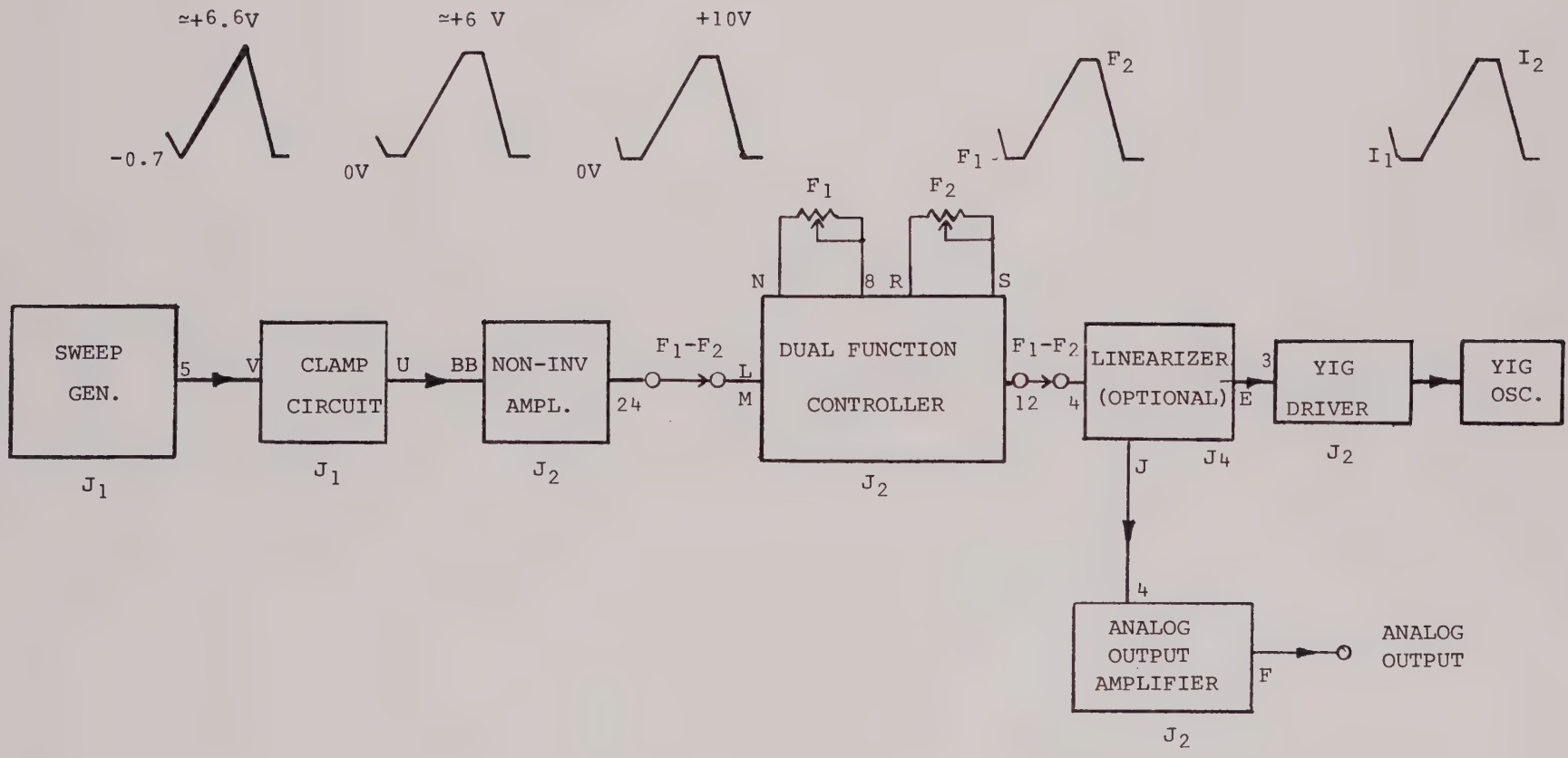
LOCAL Control: All controls are as previously described.

REMOTE Control: When in the remote mode, the unit can be controlled via the IEEE-488 Bus.

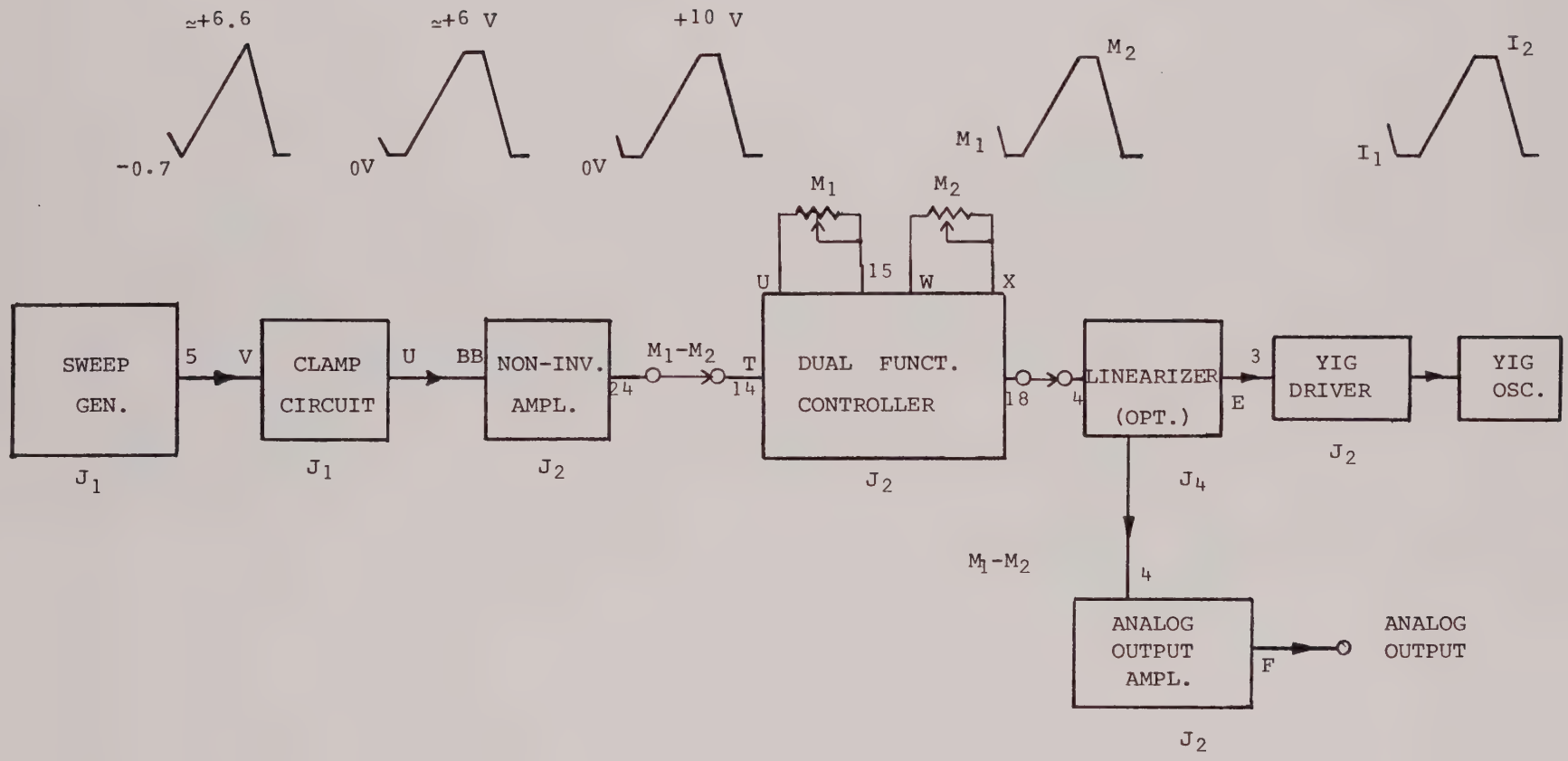
The following function can be controlled via the 488 Bus.
Frequency start and stop points.
Frequency steps (10,000 steps max).
Tuning capacitor in or out.
RF output level control.
RF on or off.



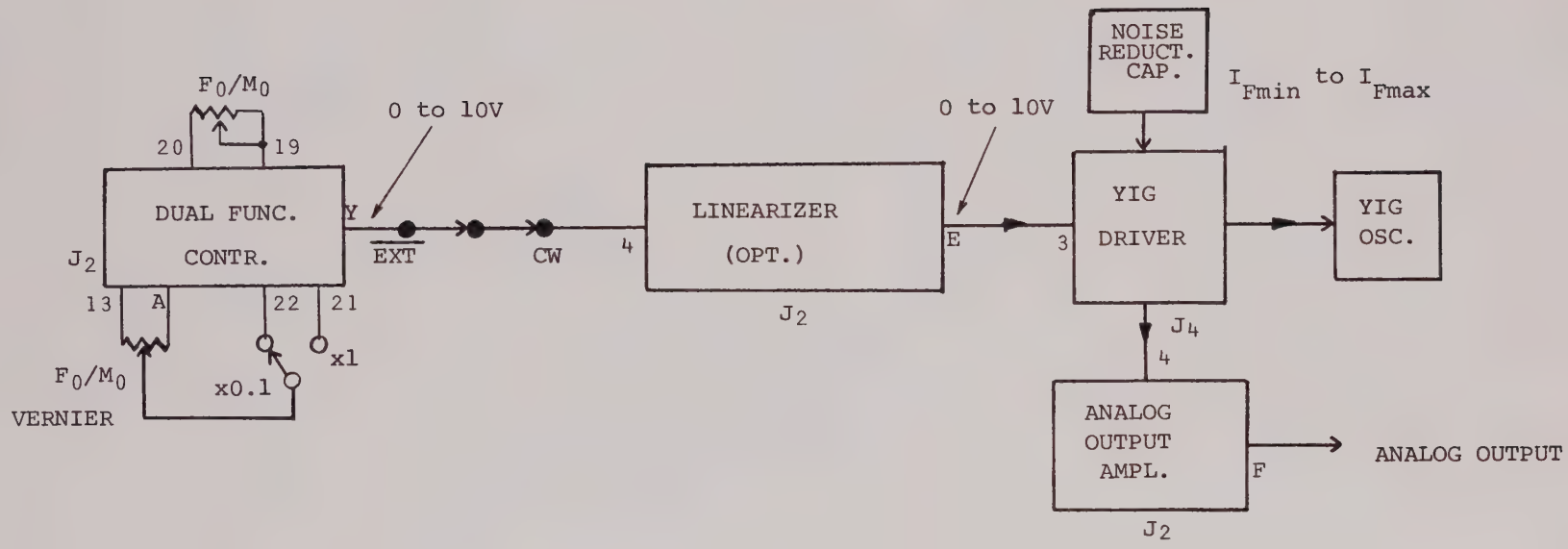
FULL SWEEP MODE



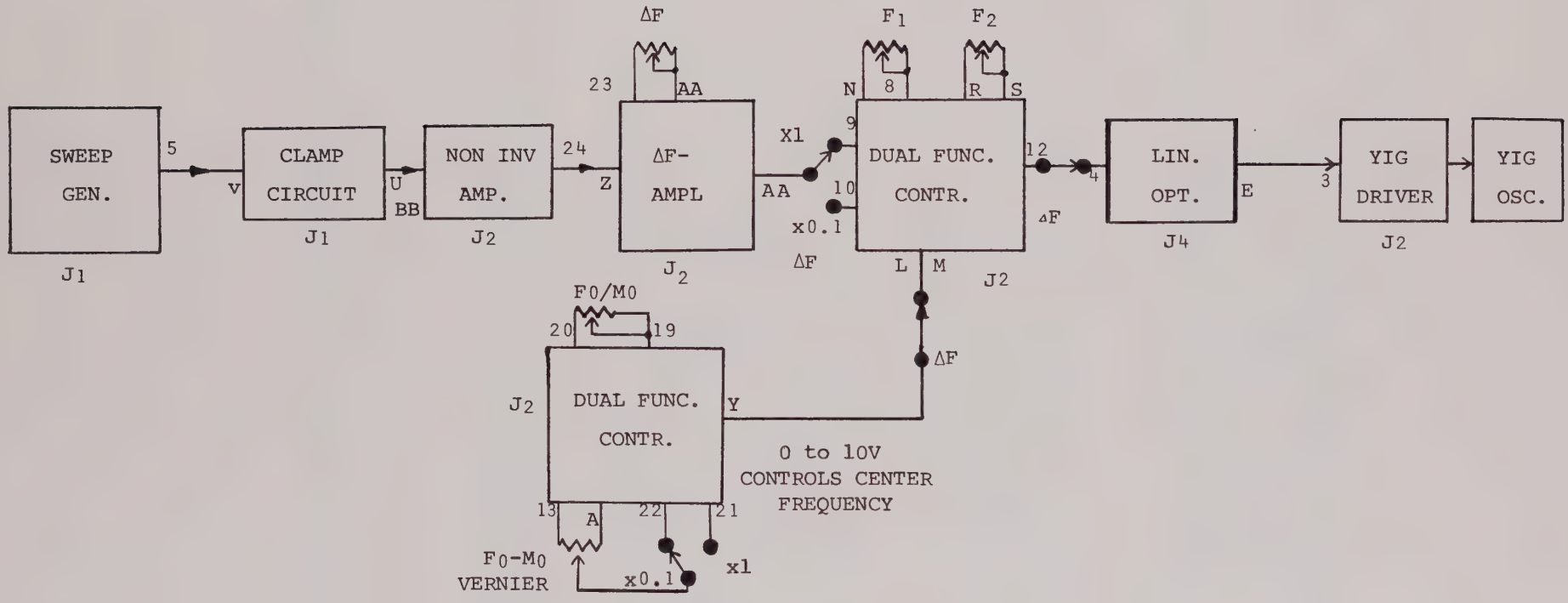
F_1-F_2 SWEEP MODE



M_1-M_2 SWEEP MODE


F0/M0
20
19
DUAL FUNC.
CONTR.
J2
Y
13
A
22
21
x1
x0.1
F0/M0
VERNIER
0 to 10V
EXT
CW
4
LINEARIZER
(OPT.)
J2
0 to 10V
E
3
NOISE
REDUCT.
CAP.
IFmin to IFmax
YIG
DRIVER
YIG
OSC.
J4
4
ANALOG
OUTPUT
AMPL.
F
ANALOG OUTPUT
J2

CW-MODE


SWEEP GEN.
J1
5
V
CLAMP CIRCUIT
J1
U
BB
NON INV AMP.
J2
24
Z
ΔF
23
AA
ΔF-AMPL
J2
Xl
AA
x0.1
10
ΔF
F1
F2
N
8
R
S
9
DUAL FUNC. CONTR.
L
M
J2
12
4
ΔF
LIN. OPT.
J4
E
3
YIG DRIVER
J2
YIG OSC.
F0/M0
20
19
J2
DUAL FUNC. CONTR.
Y
ΔF
0 to 10V
CONTROLS CENTER
FREQUENCY
13
A
22
21
F0-M0
VERNIER
x0.1
xl

ΔF-MODE

4.0 FREQUENCY AND MARKER DISPLAY

The timing diagram for sample pulses shows the timming relationship between the sweep voltages and the sampling pulses required for the digital readouts. The sweep generator provides the sweep waveform and the blanking pulse which occurs during retrace of the sweep. The leading and failing edge of the blanking pulse is used to generate the sample pulses. The failing edge generates the sampling pulse for F1 and M1 and the leading edge generates the sampling pulse for F2 and M2.

F1 and F2 Readout

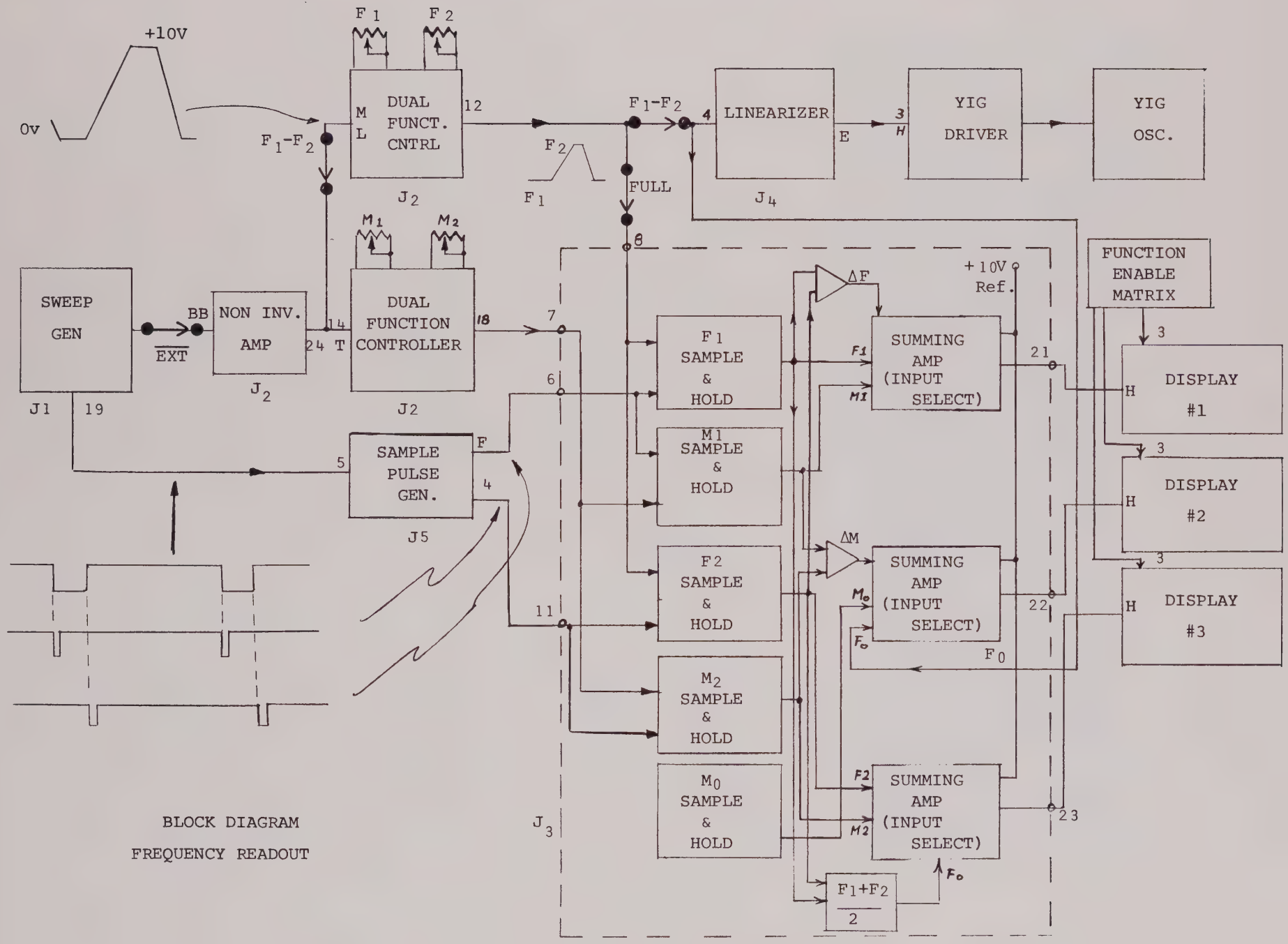
The 0 to +10V sweep voltge is applied to the Dual Function Controller and the F1 and F2 controls set the voltage at the beginning and end of the drive voltage which is applied to the linearizer. At this point, (input to the linearizer) 0 V is always equal to F min. of the unit and +10V is always equal to F max. of the unit. A linear relationship exists between voltage and frequency between these two points.

The F1 to F2 sweep signal is applied to the linearizer and also to the sample and hold circuits. When the sample pulse occurs, this F1-F2 sweep voltage is sampled and stored as a DC signal. This voltage is then applied to a summing amplifier through a FET switch. An offset is also added in the summing amplifier and the output is a voltage proportional to frequency. (1 V/10 GHz) e.g. 18 GHz = 1.800 volts. This voltage is then applied to the corresponding display unit which is a digital voltmeter with a sensitivity of 1 volt for a readout of 10.00. The FET switch which controls the inputs to the summing amplifiers allows to display several "Frequencies" on the displays.

A differential amplifier is used to generate delta F which is the difference between F2 and F1. In the delta F Sweep Mode a differential amplifier generates the center frequency F0 = (F2-F1)/2. In CW Mode, F0 is a DC voltage and no differential amplifier is used.

Similar circuits are used to generate M1, M2 and delta M.

The function enable matrix decodes the selected operating modes and enables the corresponding frequency identifiers on each digital display unit.



BLOCK DIAGRAM

FREQUENCY READOUT

Marker Pulse Generator

The M1 and M2 markers are generated by comparing the sampled M1-M2 drive voltage to the F1-F2 drive voltage. The M1-M2 dirve voltage (J2-pin18) represents the M1-frequency at the beginning of the sweep and represents M2-frequency at the end of the sweep. These values are sampled by M1 and M2 sample and hold circuits.

The dc-voltage representing the markers are compared in a voltage comparitor against the sweep voltage F1-F2. When they are equal a single pulse (one shot) is generated. The M1 and M2 marker pulses are combined with the Mo marker in the OR-gate. The combined markers are combined with the blanking pulses to generate the combined Z-Axis-marker-pen lift signal. The inverted Z-Axis marker signal is also available. The marker pulse can generate RF markers when applied to the leveling board.

UNCLAMPED SWEEP

BLANKING PULSE

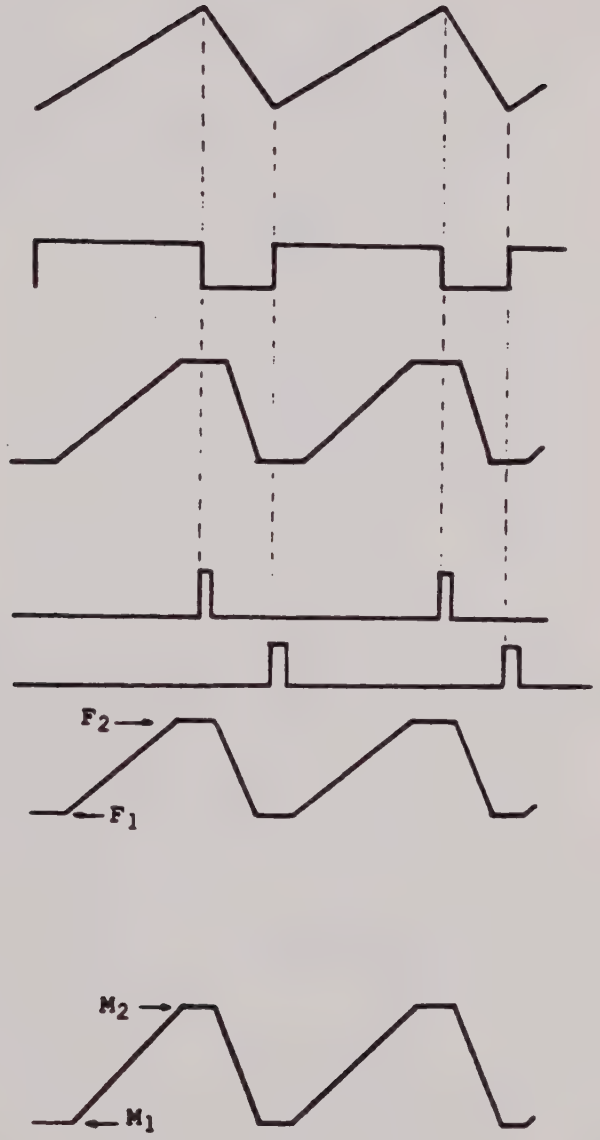
CLAMPED SWEEP WAVEFORM

SAMPLE PULSE FOR F2 AND M2 FREQUENCY READOUT

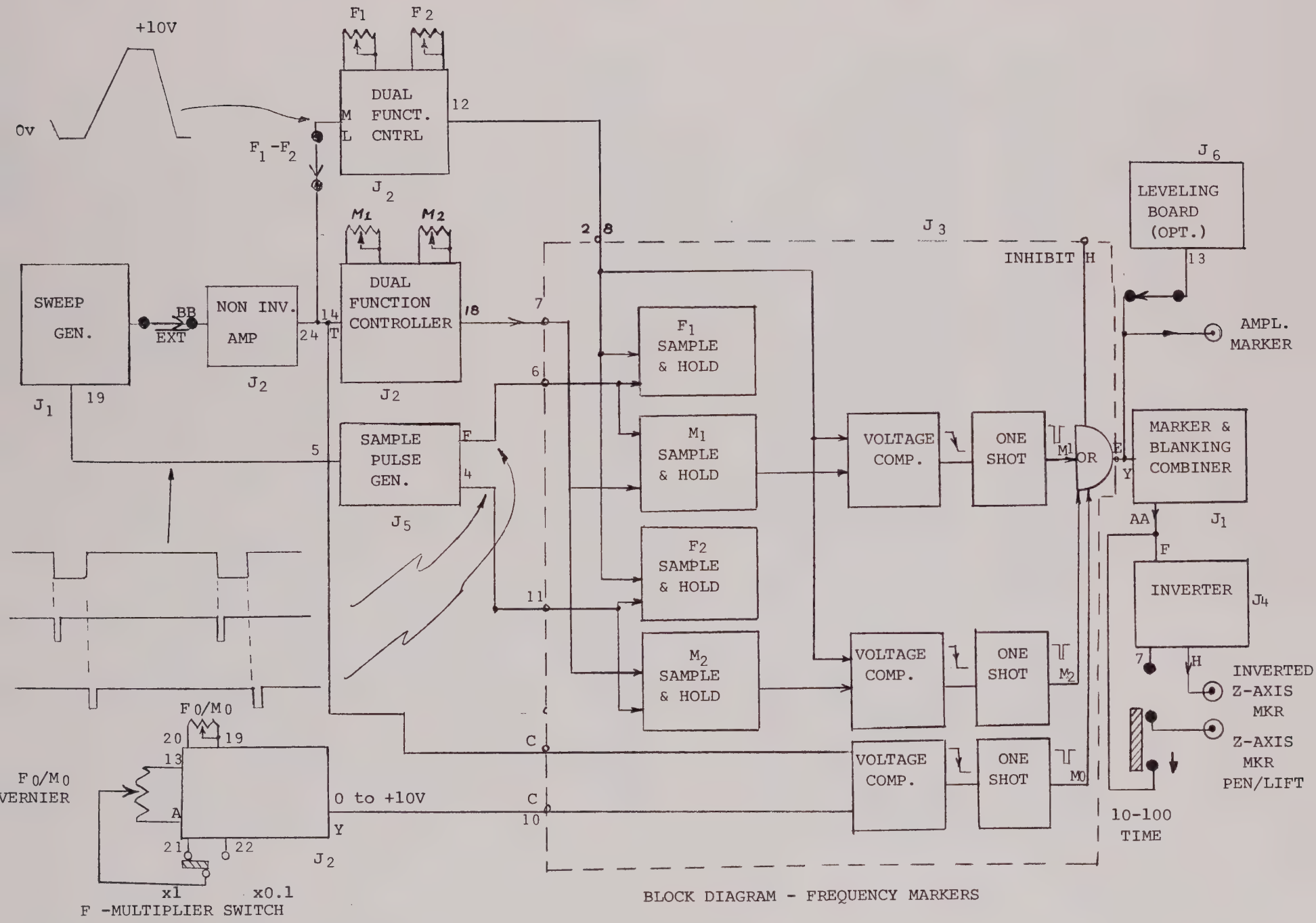
SAMPLE PULSE FOR F1 AND M1 FREQUENCY READOUT

F1 TO F2 SWEEP SIGNAL. VOLTAGE AT START OF SWEEP IS PROPORTIONAL TO F1, AND VOLTAGE AT END OF SWEEP IS PROPORTIONAL TO F2. THESE VOLTAGES ARE MEASURED BY A SAMPLE AND HOLD CIRCUIT FOR DISPLAY.

M1 TO M2 SWEEP SIGNAL. VOLTAGE AT START OF SWEEP IS PROPORTIONAL TO M1, AND VOLTAGE AT END OF SWEEP IS PROPORTIONAL TO M2. THESE VOLTAGES ARE MEASURED BY A SAMPLE AND HOLD CIRCUIT FOR DISPLAY.



TIMING DIAGRAM FOR SAMPLE PULSES



BLOCK DIAGRAM - FREQUENCY MARKERS

5.0 CIRCUIT DESCRIPTION

5.1 POWER SUPPLY

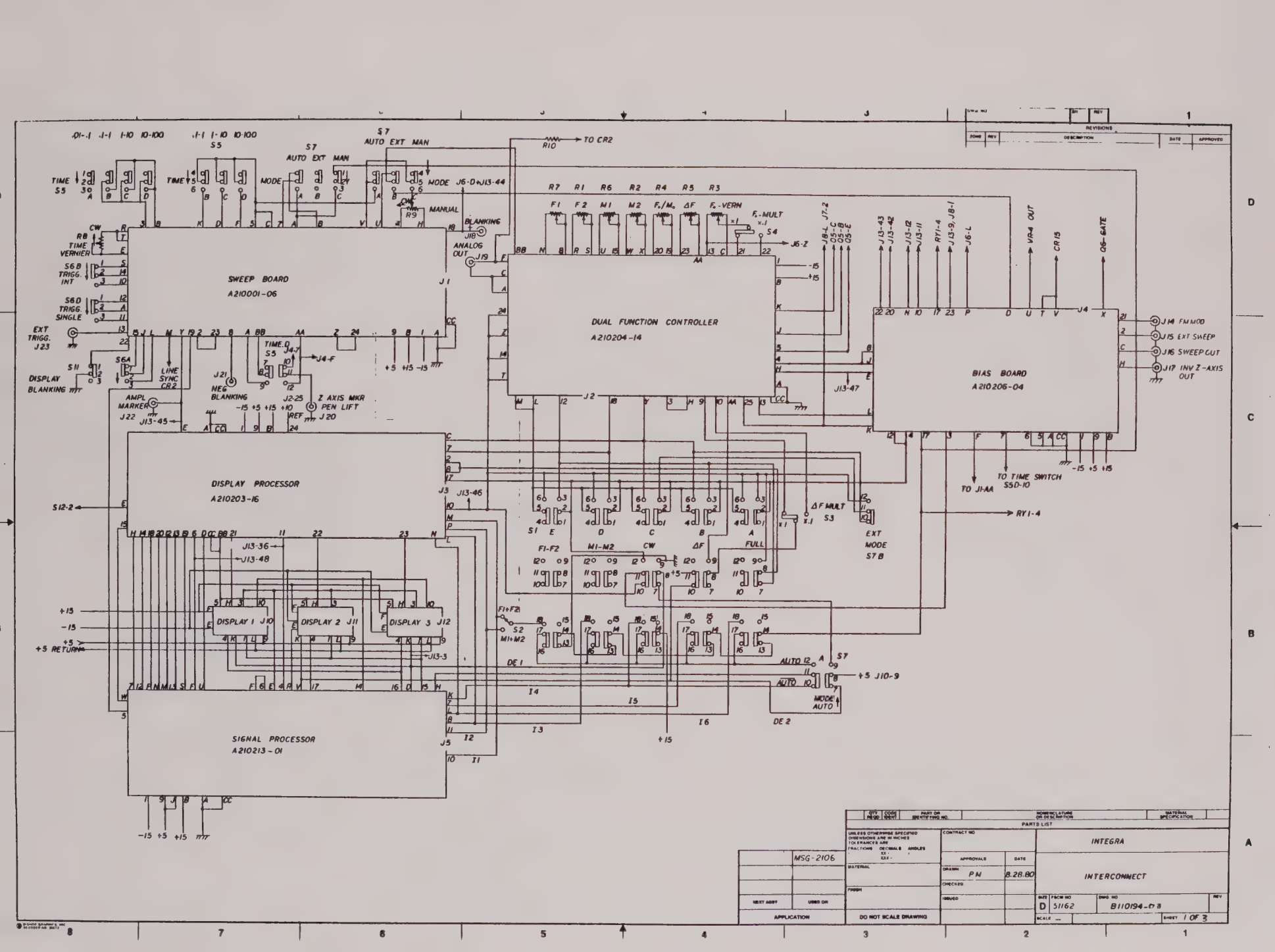
The power supply consists of 3 independent sections. Transformer T1, rectifiers CR1, CR2 and filter capacitors C1 and C2 provide the unregulated DC voltages to the integrated three terminal regulators VR1 and VR2. CR5-CR10 are protection diodes for the regulators.

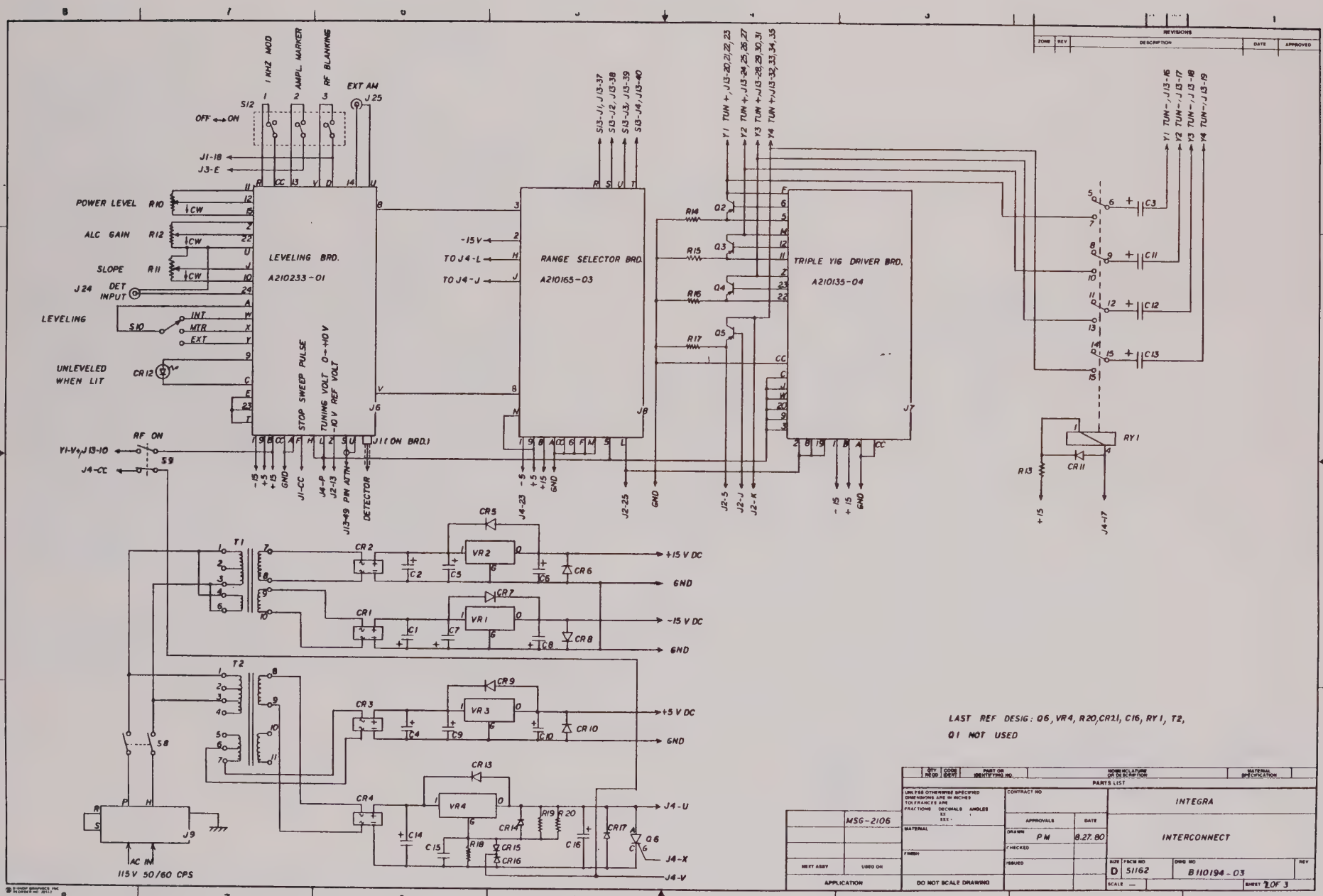
Transformer T2, rectifier CR4 and filter capacitor C17 provide the unregulated voltage for the Gunn oscillator bias regulator. This regulator is set-up by R18-R20 for the maximum bias voltage at the lowest oscillator frequency. The voltage is programed down with increasing oscillator frequency through CR15 from the bias board. CR 13,14 and 17 are protection diodes. Q6 is a silicon controlled rectifier to clamp the output voltage to zero if triggered by the overvoltage protection circuit on the bias board.

T3, CR3, C4 and VR3 form a +5 volt power supply for the digital circuits and displays.

5.2 INTERCONNECT DIAGRAM

The interconnect diagram for a mutli-oscillator unit (MODEL MSG-2106) B110194-03 (sheet 1 and 3). They indicate the interconnect between the printed circuit boards and all other components.


SWEEP BOARD
A210001-06
DUAL FUNCTION CONTROLLER
A210204-14
BIAS BOARD
A210206-04
DISPLAY PROCESSOR
A210203-16
SIGNAL PROCESSOR
A210213-01
DISPLAY 1 J10
DISPLAY 2 J11
DISPLAY 3 J12
TO CR2
TO TIME SWITCH S5D-10
TO J1-AA
RY1-4
J14 FM MOD
J15 EXT SWEEP
J16 SWEEP OUT
J17 INV Z-AXIS OUT
EXT MODE S7B
ΔF MULT S3
DISPLAY BLANKING
AMPL MARKER J22
NEG BLANKING J21
Z AXIS MKR PEN LIFT J20
LINE SYNC CR2
EXT TRIGG. J23
+5 RETURN
INTEGRA
INTERCONNECT
MSG-2106
D 51162
B110194-03
1 OF 3
DO NOT SCALE DRAWING



LAST REF DESIG: Q6, VR4, R20, CR21, C16, RY1, T2,
Q1 NOT USED

REVISIONS				
ZONE	REV	DESCRIPTION	DATE	APPROVED

PARTS LIST

QTY REQD	CODE IDENT	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	MATERIAL SPECIFICATION

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ARE
FRACTIONS DECIMALS ANGLES
.XX ±
.XXX ±

MATERIAL

FINISH

NEXT ASSY | USED ON

APPLICATION

MSG-2106

DO NOT SCALE DRAWING

CONTRACT NO

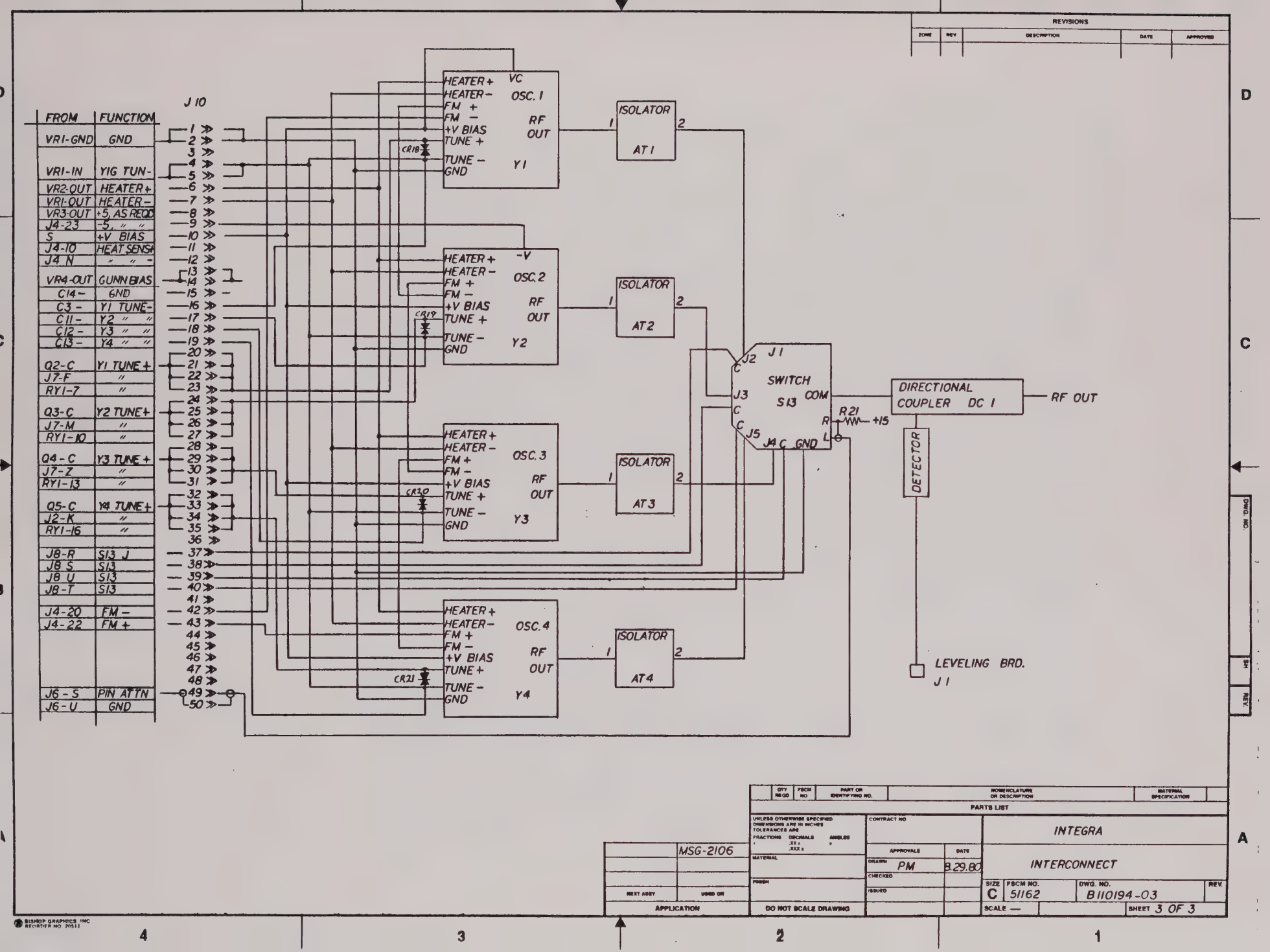
APPROVALS	DATE
DRAWN P M	8.27.80
CHECKED	
ISSUED	

INTEGRA

INTERCONNECT

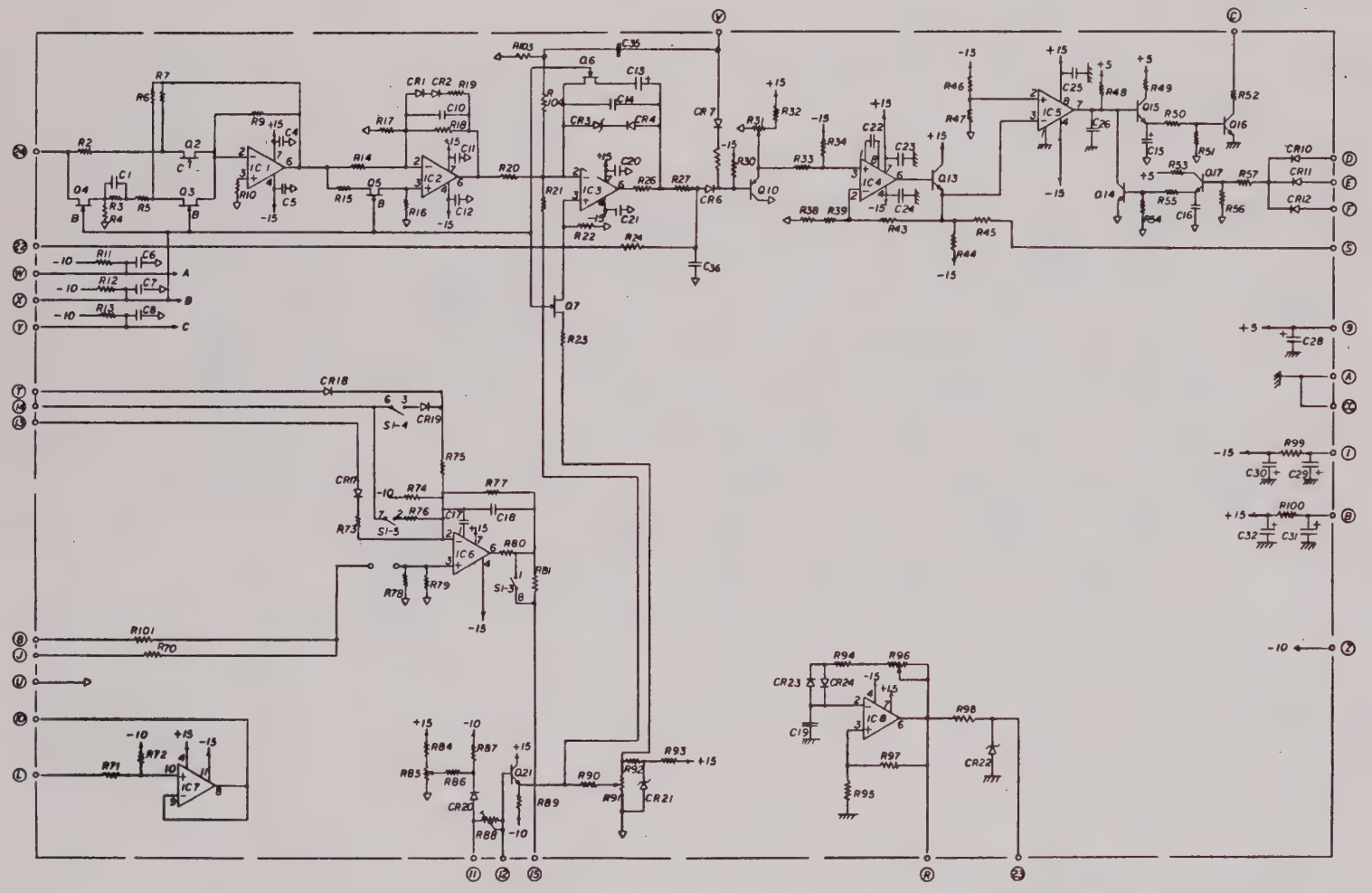
SIZE D | FSCM NO 51162 | DWG NO B110194-03 | REV

SCALE — | SHEET 2 OF 3


REVISIONS
ZONE REV DESCRIPTION DATE APPROVED
J10
FROM FUNCTION
VR1-GND GND
VR1-IN YIG TUN-
VR2-OUT HEATER+
VR1-OUT HEATER-
VR3-OUT +5, AS REQD
J4-23 -5, " "
S +V BIAS
J4-10 HEAT SENSE
J4 N " " -
VR4-OUT GUNN BIAS
C14- GND
C3- Y1 TUNE-
C11- Y2 " "
C12- Y3 " "
C13- Y4 " "
Q2-C Y1 TUNE+
J7-F "
RY1-7 "
Q3-C Y2 TUNE+
J7-M "
RY1-10 "
Q4-C Y3 TUNE+
J7-Z "
RY1-13 "
Q5-C Y4 TUNE+
J2-K "
RY1-16 "
J8-R S13 J
J8 S S13
J8 U S13
J8-T S13
J4-20 FM-
J4-22 FM+
J6-S PIN ATTN
J6-U GND
HEATER+
HEATER-
FM +
FM -
+V BIAS
TUNE +
TUNE -
GND
VC
-V
OSC. 1
OSC. 2
OSC. 3
OSC. 4
RF OUT
Y1
Y2
Y3
Y4
CR18
CR19
CR20
CR21
ISOLATOR
AT1
AT2
AT3
AT4
J1
J2
J3
J4
J5
SWITCH
S13
COM
GND
DIRECTIONAL COUPLER DC1
RF OUT
R21
+15
DETECTOR
LEVELING BRD.
J1
QTY REQD
FSCM NO.
PART OR IDENTIFYING NO.
NOMENCLATURE OR DESCRIPTION
MATERIAL SPECIFICATION
PARTS LIST
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ARE
FRACTIONS DECIMALS ANGLES
CONTRACT NO
APPROVALS DATE
DRAWN PM 8.29.80
CHECKED
ISSUED
MATERIAL
FINISH
NEXT ASSY USED ON
APPLICATION
DO NOT SCALE DRAWING
MSG-2106
INTEGRA
INTERCONNECT
SIZE C
FSCM NO. 51162
DWG. NO. B110194-03
REV.
SCALE —
SHEET 3 OF 3
BISHOP GRAPHICS INC RECORDER NO 20511
4
3
2
1
A
D
C
B
A

5.3 LEVELLING BOARD

IC 1 is an inverting amplifier with FET switching at the input. Q1,Q2. & Q3 are used to switch the internal/external or meter input to IC 1. C1, R3 & R4 form a compensation network for power meter leveling. IC 2 forms an inverting or non-inverting amplifier depending whether Q5 is on or off. IC 2 is inverting when in internal leveling or external leveling and the operational amplifier IC 2 functions as an non-inverting amplifier in the power meter leveling mode. IC 3 is the summing amplifier for the detected signal and the reference. IC 6 forms the reference voltage and is then modified by the external RF level control which is connected to pin 11, 12, & 15. IC 7 A&B are used to modify the reference voltage dependent on the frequency. One volt per GHz voltage is applied to pin H and then offset and amplified as necessary and applied through Q18 to the reference amplifier IC 6. This internal compensation is only active in internal sweep mode. IC 7C offsets the 0 to 10V sweep voltage which is applied on pin L in order to have a -5 to 0 V on pin 10. R70 is used to sum in a slope correction voltage to the reference amplifier. External AM modulation is applied to pin 14 and if switch S15 is closed, R76 allows the reference to be modulated. If switch S1-4 is closed only positive modulation signals are applied through R75 to the reference amplifier. Amplitude markers are applied to pin 13 and summed through CR17 and R73 to the reference amplifier. On pin T the internal 1 KHz modulation is applied and modulates the reference again. R88 functions as an upper power level clamp while R85 is a lower power level clamp. IC 8 generates a 1 KHz square wave voltage and the frequency can be adjusted by R96. R98 and CR22 generate a -.7 to +5 V square wave which is used to modulate the reference. On pin R a ground can be applied when the 1 KHz modulation oscillator is not desired. IC4 and Q13 form the output drive amplifier and the signal for the pin modulator is applied through R45 to pin S. IC 5 is a comparator and drives Q15 & Q16 which drive the unleveled when lit LED. CR10, CR11 & CR12 together with Q17 & Q14 allow to inhibit the turn-on of the unleveled when lit indicator during flyback and modulation of the reference. When in external leveling mode R25 allows pre-setting of the gain which is determined by Q9 which shunts R27.



LAST REFR DESIGNATION : R104, Q21, C36, CR24, IC8, J1

MSG 2100B	
MATERIAL	
FINISH	
NEXT ASSY	USED ON
APPLICATION	DO NOT SCALE DRAWING

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES. TOLERANCES ARE: FRACTIONS ± DECIMALS .XX ± .XXX ± ANGLES ±

CONTRACT NO

APPROVALS	DATE
DRAWN PM	8-12-80
CHECKED	
ISSUED	

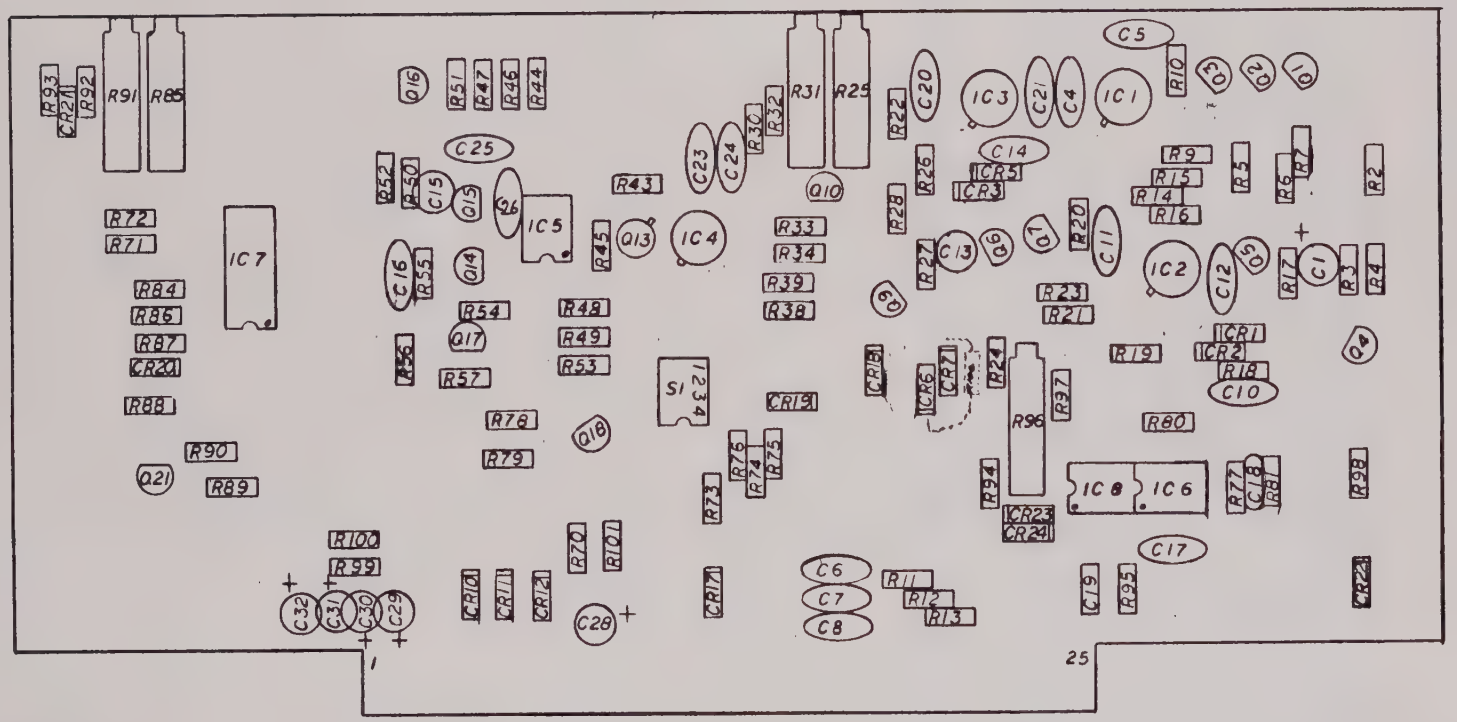
INTEGRA

LEVELING BOARD

D | Mdwg no. 51162 | Dwg. no. B110233-03 | REV

SCALE — | SHEET

REVISIONS				
ZONE	REV.	DESCRIPTION	DATE	APPROVED



QTY REQD	CODE IDENT	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	MATERIAL SPECIFICATION
			PARTS LIST	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ARE
FRACTIONS DECIMALS ANGLES
.XX ±
.XXX ±

CONTRACT NO.

	APPROVALS	DATE
MATERIAL	DRAWN PM	8-6-80
FINISH	CHECKED	
	ISSUED	

INTEGRA

LEVELING BOARD

NEXT ASSY	USED ON
MSG-2100B	
APPLICATION	DO NOT SCALE DRAWING

SIZE C | FSCM NO. 51162 | DWG. NO. B210233-03 | REV. A

SCALE 2:1 | SHEET

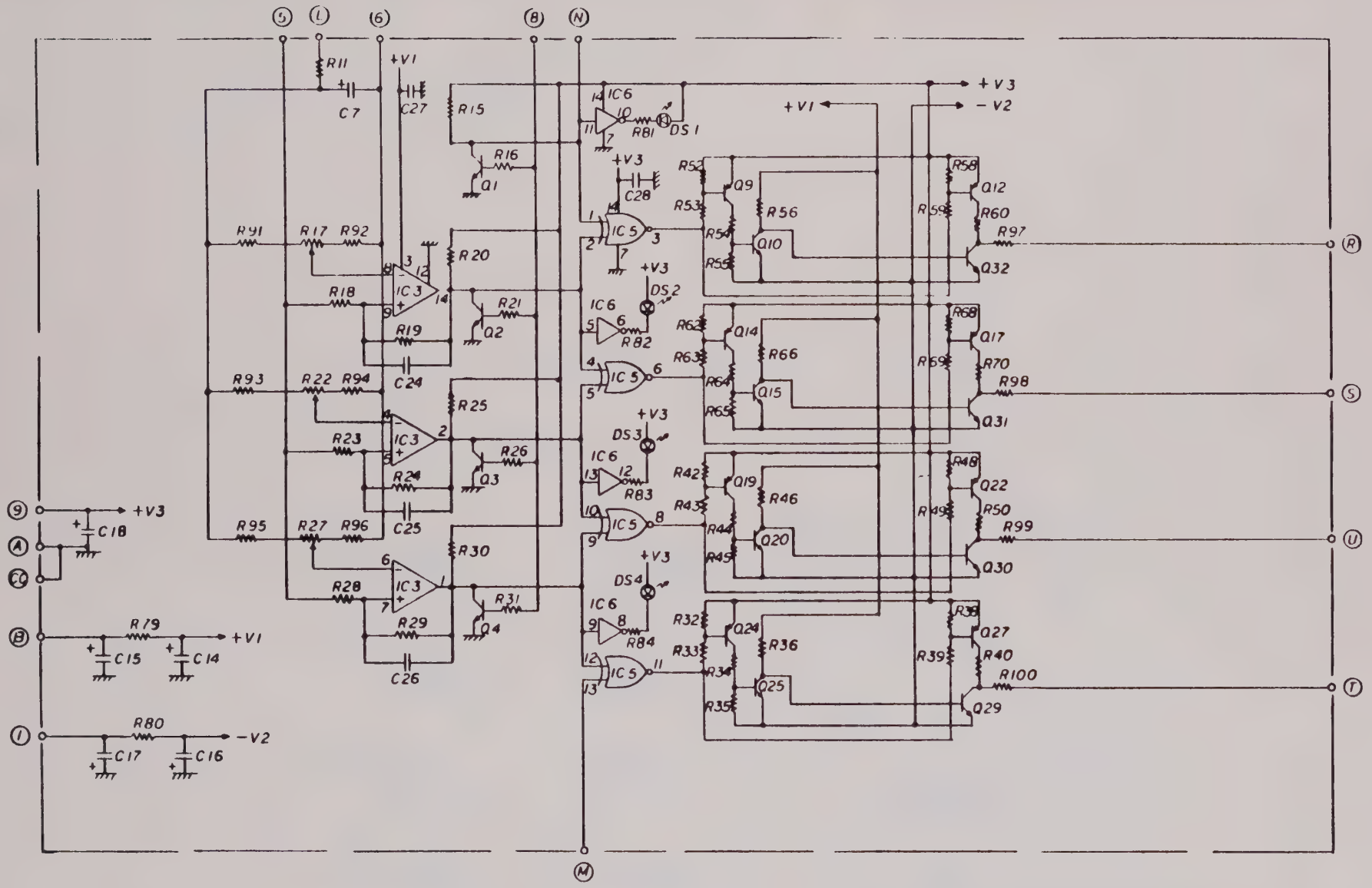
BISHOP GRAPHICS, INC. REORDER NO 20511

5.4 RANGE SELECTOR BOARD

The range selector board controls the RF-pin switch and selects the desired oscillator. The tuning voltage (0 to +10V for full range) is applied to Pin 5 of the board. IC3 is a quad-comparitor circuit. A +10V reference voltage on Pin L is filtered by R11 and C7 and then feeds the divider circuit R19, R17 and R92. This divider sets the first switchover point. IC4 is an exclusive "OR"-gate and its logic allows only one pin driver circuit to be "on" at one time. Q9, Q10, Q12 and Q32 form a pin driver circuit.

IC6 is an inverter used to drive the indicators DS1 through DS4 which display the active pin driver. Q1 through Q4 are driven by the blanking signal on Pin 8 and turn off all pin switches during retrace if RF-blanking has been selected.

These identical threshold circuits and 4 identical pin drivers are on the range selector board.



PARTS LIST

QTY REQD	CODE IDENT	PART OR IDENTIFYING NO	NOMENCLATURE OR DESCRIPTION	MATERIAL SPECIFICATION

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ARE FRACTIONS DECIMALS ANGLES .X ±.1 .XX ±.01

CONTRACT NO

APPROVALS	DATE
DRAWN PM	8-8-80
CHECKED	
ISSUED	

INTEGRA

RANGE SELECTER BOARD

SIZE	FSCM NO	DWG NO	REV
C	51162	8110165-03	

SCALE SHEET

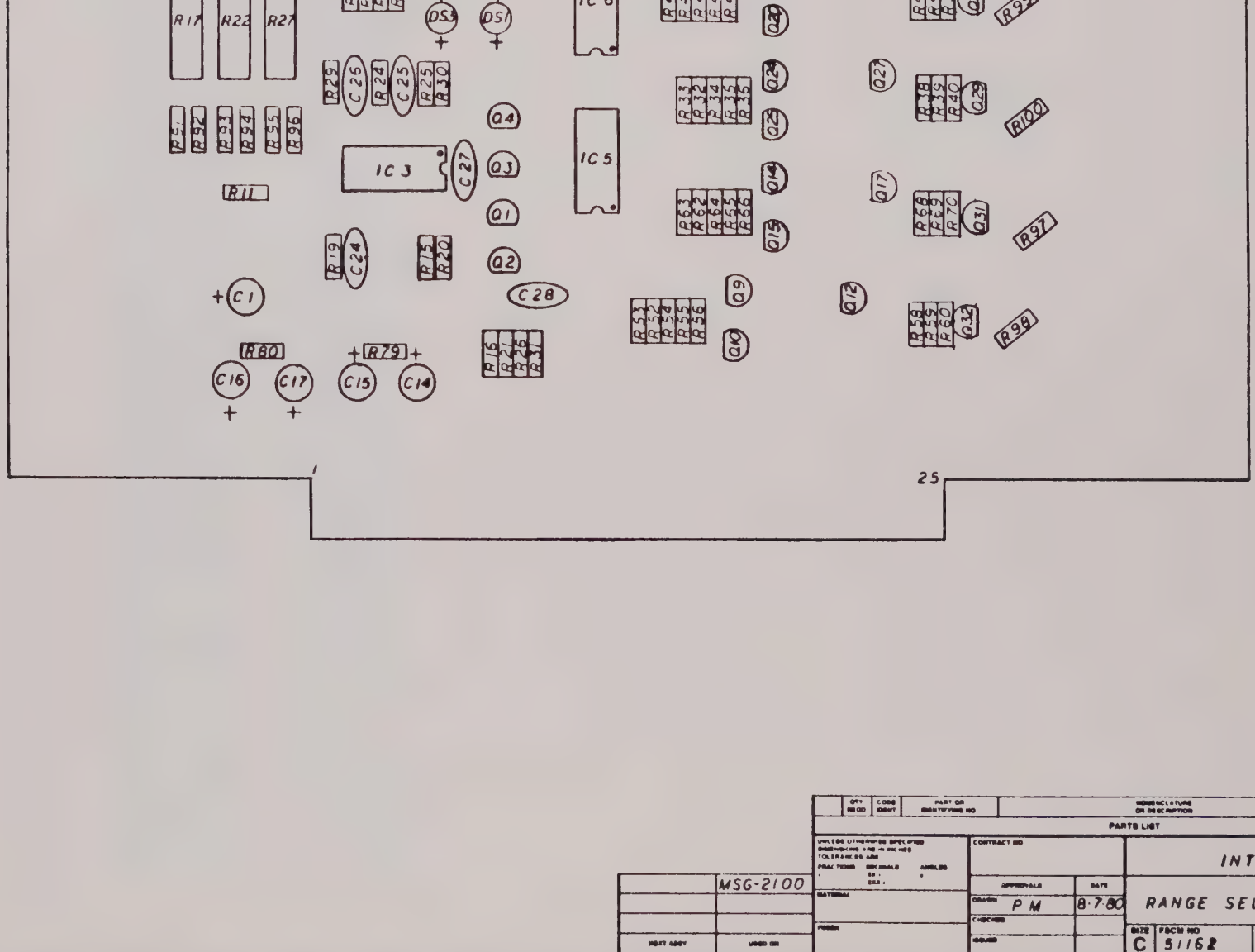
MATERIAL MSG-2100

FINISH

NEXT ASSY USED ON

APPLICATION

DO NOT SCALE DRAWING



QTY REQD	CODE IDENT	PART OR IDENTIFYING NO	NOMENCLATURE OR DESCRIPTION	MATERIAL SPECIFICATION
			PARTS LIST	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ARE FRAC ± DEC ±. ANGLES ±°

CONTRACT NO

APPROVALS	DATE
DRAWN P M	8·7·80
CHECKED	
ISSUED	

MATERIAL

FINISH

NEXT ASSY | USED ON

APPLICATION

DO NOT SCALE DRAWING

MSG-2100

INTEGRA

RANGE SELECTER BOARD

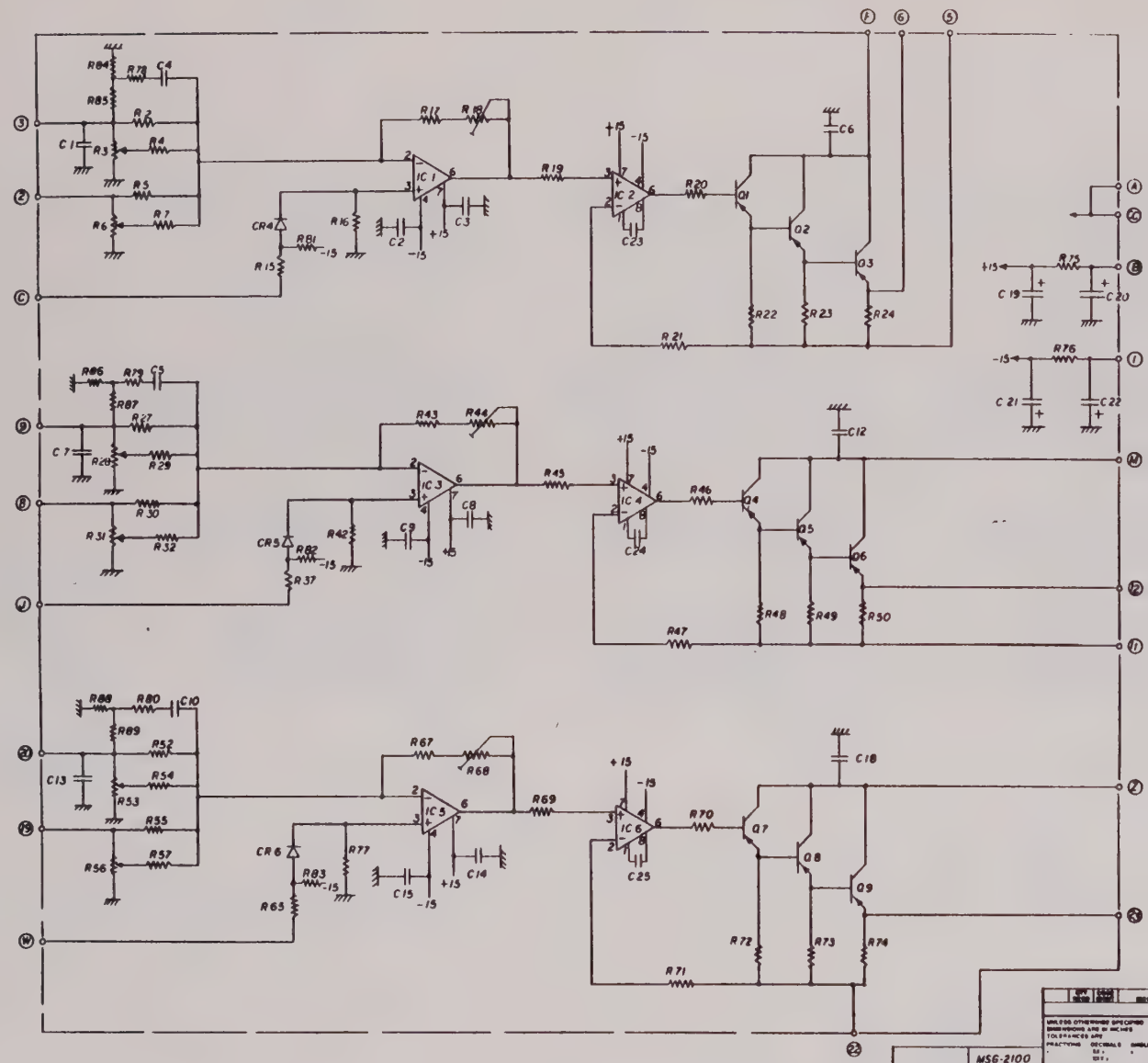
SIZE	FSCM NO	DWG NO	REV
C	51162	B 210165-03	A

SCALE 2·1 | SHEET

5.5 TRIPLE YIG DRIVER BOARD

The triple YIG driver contains three identical drivers. IC1 is the summing amplifier and combines four different input signals. On Pin 2 a +10V reference voltage sets the start point of the YIG driver (R 5,6,7). The 0 to +10V tuning voltage on Pin 3 controls the range of the driver (start to stop) with R 2,3,4. A dynamic sweep delay compensation for the YIG is added by R 85,84,78 and C4.

The tuning voltage (0 to +10v) on Pin C is used to reduce the YIG driver current after the YIG OSC passed through it's frequency range. The amount and breakpoint is determined by R 15,16,81. IC2 is a voltage follower with current boosting transistors Q1, Q2 and Q3.



REVISIONS				
ZONE	REV	DESCRIPTION	DATE	APPROVED

PARTS LIST

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NEXT ASSY	USED ON		
APPLICATION	DO NOT SCALE DRAWING		

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES. TOLERANCES ARE: FRACTIONS DECIMALS ANGLES .XX ± .XXX ±

CONTRACT NO

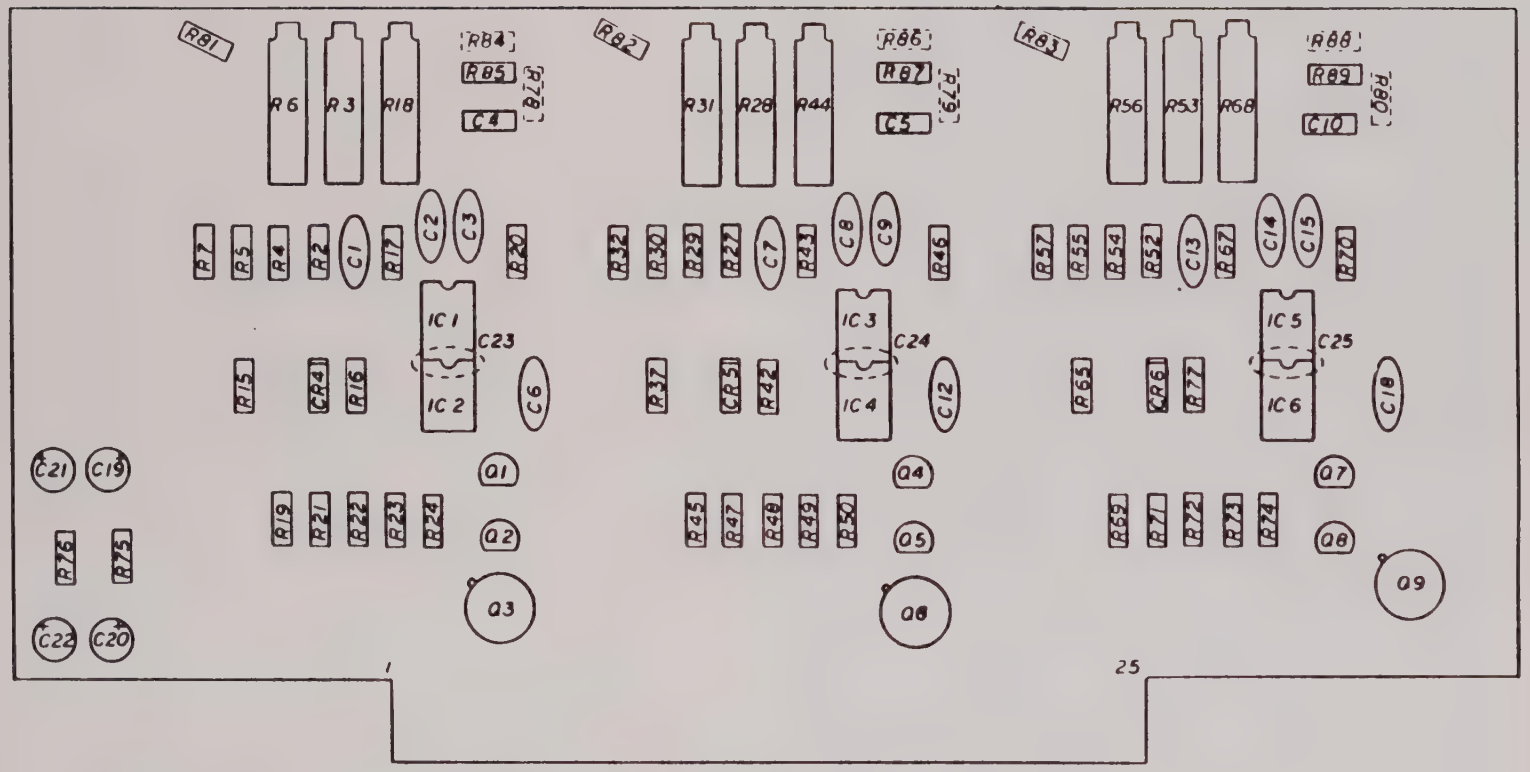
APPROVALS	DATE
DRAWN PM	8 20 80
CHECKED	
ISSUED	

INTEGRA

TRIPLE Y16 DRIVER

SIZE D | FSCM NO 51162 | DWG NO 8110135-04 | REV

SCALE — | SHEET



NOTE: C23-25 MOUNTED ON BACK SIDE OF BRD. TO PINS 1 AND 8 OF IC2, 4 AND 6

QTY REQD	FSCM NO	PART OR IDENTIFYING NO	NOMENCLATURE OR DESCRIPTION	MATERIAL SPECIFICATION

PARTS LIST

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ARE
FRACTIONS DECIMALS ANGLES
.X ±
.XX ±
.XXX ±

CONTRACT NO

	APPROVALS	DATE
DRAWN	P M	8 21 80
CHECKED		
ISSUED		

MATERIAL

FINISH

DO NOT SCALE DRAWING

	MSG-2100
NEXT ASSY	USED ON
APPLICATION	

INTEGRA

TRIPLE YIG DRIVER

SIZE	FSCM NO	DWG NO	REV
C	51162	B210135-04	

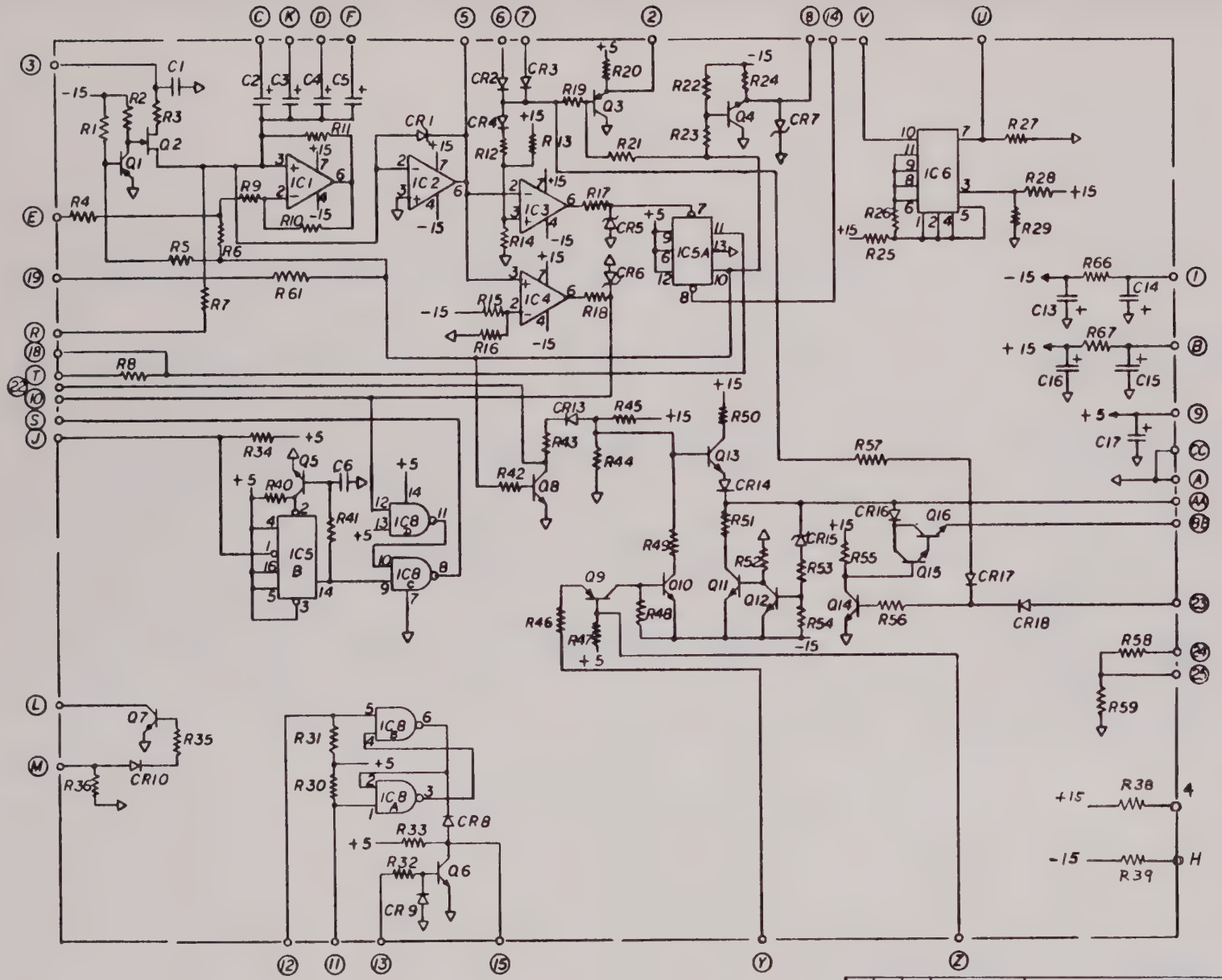
SCALE 2:1 SHEET

5.6 SWEEP GENERATOR BOARD

Sweep Generator PCB Assembly contains an integrator formed by IC1, IC2, and integrating capacitors C2 through C5. The integrating mode of IC2 (up or down) is controlled by flip-flop IC5A. IC3 is a voltage comparator, which compares the sweep voltage against a fixed positive voltage. When this voltage is reached by the sweep ramp, the comparator triggers IC5A and the integration process starts in the opposite direction. When the negative voltage level is reached, IC4 acts as a comparator and triggers IC5A (through the INT TRIGGER switch) to again reverse the integration function of IC2. Q1 and Q2 form an additional current source and are turned on during flyback of the sweep voltage to shorten the fly-back time (except in the .01 - .1 second TIME mode). IC6 clamps the sweep ramp to a fixed voltage at the beginning and at the end of the sweep. (0 to approx. +6 V).

CR10, and Q7, generate a line sync pulse. IC8A and IC8C forms a flip-flop for single sweep triggering. The flip-flop IC5B receives a toggle signal from either LINE sync, EXT trigger, or SINGLE sweep (depending upon the TRIGGER switch setting), and generates a sync pulse which is applied to IC8-pin 9 controlling the start of the sweep by clearing IC5A.

The marker pulses from pin Y and the blanking signal are combined in Q8 through Q16 to form the Z-AXIS-MKR-PEN LIFT signal on pin AA.



QTY REQD	CODE IDENT	PART OR IDENTIFYING NO	NOMENCLATURE OR DESCRIPTION	MATERIAL SPECIFICATION

PARTS LIST

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ARE
FRACTIONS DECIMALS ANGLES
.XX ±
.XXX ±

CONTRACT NO

	APPROVALS	DATE
DRAWN	PM	8-14-80
CHECKED		
ISSUED		

MATERIAL

FINISH

DO NOT SCALE DRAWING

NEXT ASSY	USED ON
APPLICATION	

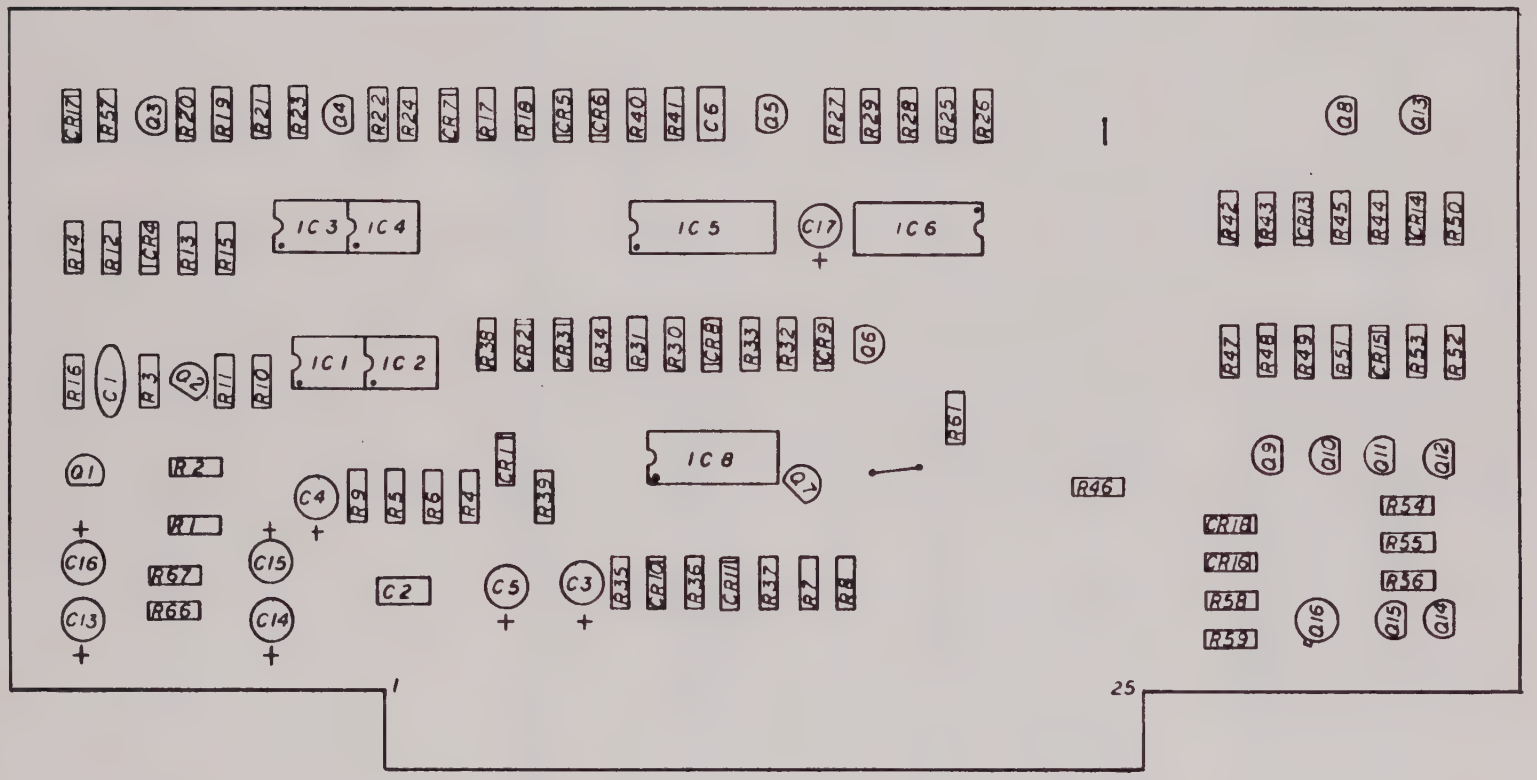
MSG-2100

INTEGRA

SWEEP GENERATOR BOARD

SIZE	FSCM NO.	DWG NO	REV
C	51162	B110001-06	

SCALE —— SHEET



QTY REQD	CODE IDENT	PART OR IDENTIFYING NO	NOMENCLATURE OR DESCRIPTION	MATERIAL SPECIFICATION

PARTS LIST

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ARE
FRACTIONS DECIMALS ANGLES
.X ±
.XX ±

CONTRACT NO.

	APPROVALS	DATE
DRAWN	P M	8-6-80
CHECKED		
ISSUED		

MATERIAL

FINISH

DO NOT SCALE DRAWING

INTEGRA

SWEEP GENERATOR BD.

NEXT ASSY	USED ON
	MSG-2100
APPLICATION	

SIZE C | FSCM NO 51162 | DWG NO. B210001-06 | REV

SCALE 2:1 | SHEET

5.7 DUAL FUNCTION CONTROLLER BOARD

Dual Function Controller PCB Assembly contains the circuitry to control the F1-F2 SWEEP, M1-M2 SWEEP, delta F sweep current, REFR. Voltage generator, and a YIG Driver output. IC6A and IC6B form a variable voltage source over the range of 0 to +10 V, and are controlled by the Fo/Mo potentiometer. In the CW mode, this potentiometer controls the CW output frequency In the delta F mode, this potentiometer controls the center freqency on which the delta F sweep is superimposed. In the F1-F2 mode, this potentiometer controls the M0-MARKER position.

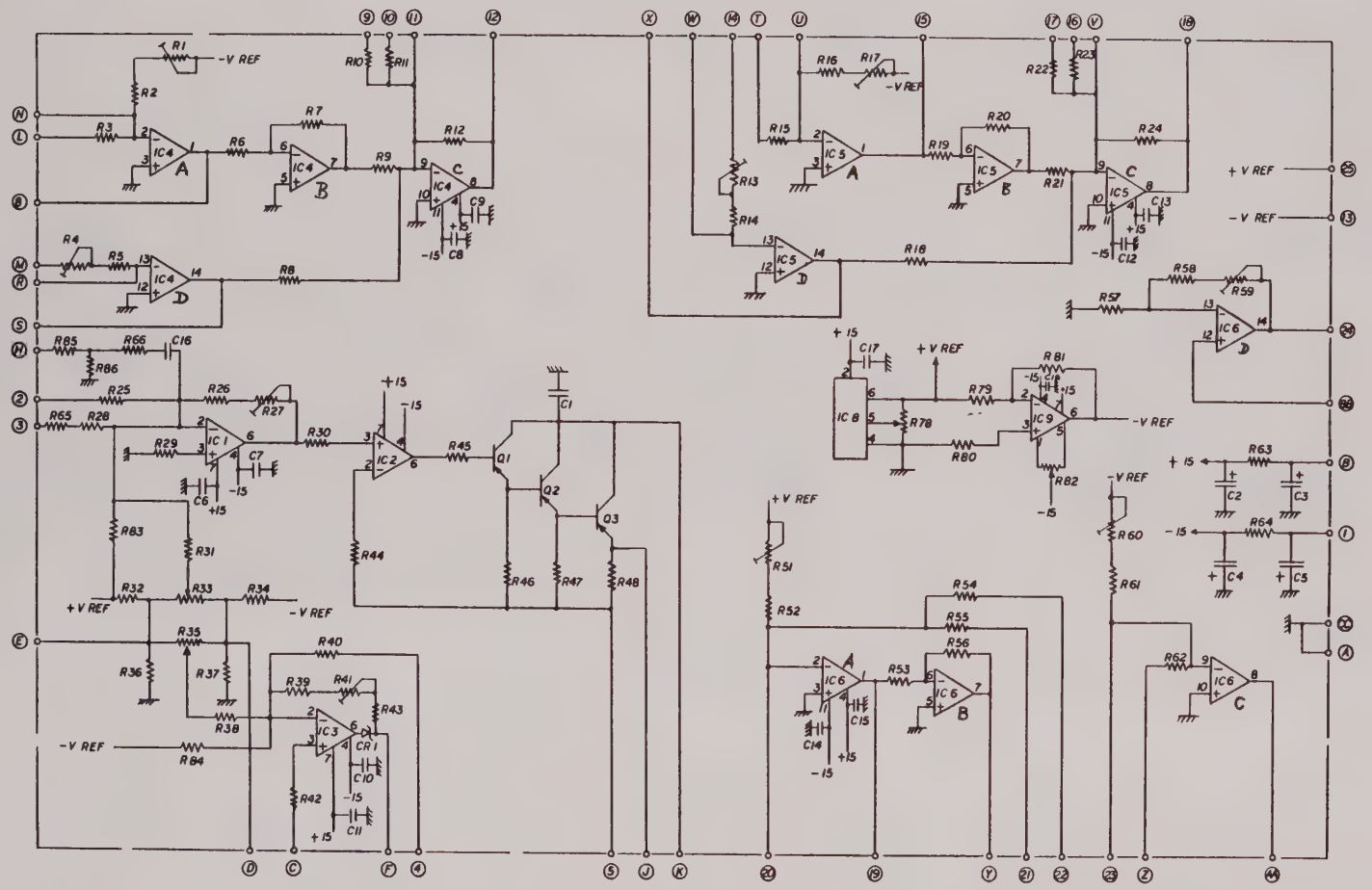
IC4A is a variable gain, inverting offset amplifier; IC4B is an inverter with a gain of -1; IC4D is an inverting amplifier with a variable gain of 0 to -1. The gain controls of IC4A and IC4D set the F1 ans F2 points of the sweep. IC4C is a summing amplifier.

IC5A is a variable gain, inverting offset amplifier; IC5B is an inverter with a gain of -1; IC5D is an inverting amplifier with a variable gain of 0 to -1. The gain controls of IC5A and IC5D set the M1 ans M2 points of the sweep. IC5C is a summing amplifier.

IC6C is an inverting offset amplifier of variable gain, whose function is to control the delta F sweep in the delta F SWEEP MODE.

IC6D is a non-inverting amplifier that amplifies the sweep ramp to a fixed 0 to +10 V. IC1 is the inverting amplifier of the YIG Driver. IC2 is a voltage follower with current boosting transistors Q1, Q2, and Q3. IC3 amplifies and offsets the effective sweep voltage to generate the ANALOG-output.

IC8 generates a +10.000 V voltage reference for the unit. IC9 inverts this positive reference voltage to generate a negative -10.000 V reference.



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NEXT ASSY	USED ON				
APPLICATION		DO NOT SCALE DRAWING			

QTY REQD	CODE IDENT	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	MATERIAL SPECIFICATION
			PARTS LIST	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ARE
FRACTIONS DECIMALS ANGLES
.X ±.1
.XX ±.01

CONTRACT NO

	APPROVALS	DATE
DRAWN	PM	8.26.80
CHECKED		
ISSUED		

MATERIAL

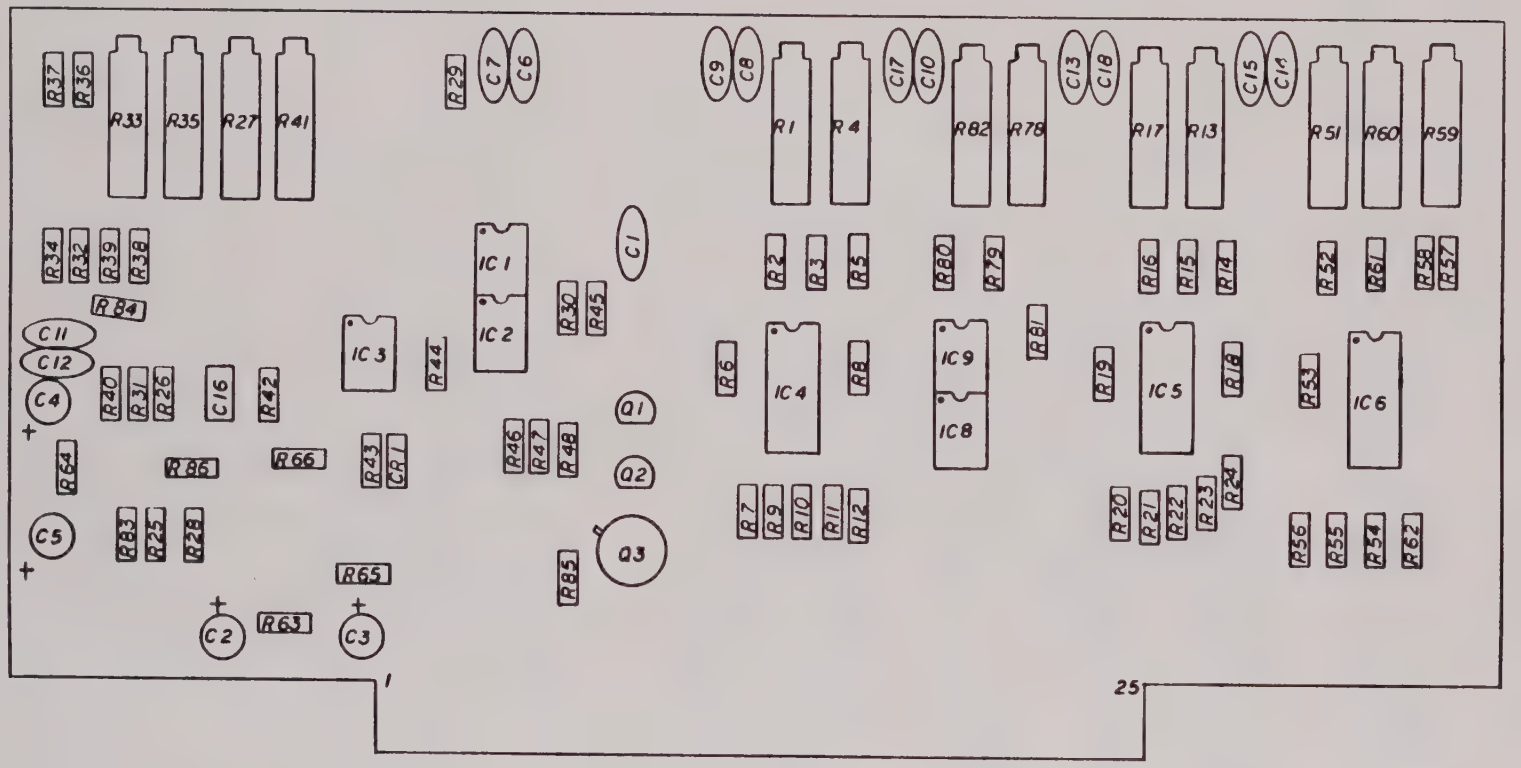
FINISH

INTEGRA

DUAL FUNCTION CONTROLLER

SIZE D | FSCM NO 51162 | DWG NO B 110204-04 | REV

SCALE — | SHEET



QTY REQD	PSCM NO	PART OR IDENTIFYING NO	NOMENCLATURE OR DESCRIPTION	MATERIAL SPECIFICATION
			PARTS LIST	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ARE
FRACTIONS ± DECIMALS ± ANGLES ±
.X ± .XX ± °
.XXX ±

CONTRACT NO.

APPROVALS	DATE
DRAWN P M	8.26.80
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ISSUED	

MATERIAL

FINISH

DO NOT SCALE DRAWING

MSG-2100

NEXT ASSY | USED ON

APPLICATION

INTEGRA

DUAL FUNCTION CONTROLLER

SIZE	PSCM NO.	DWG NO.	REV
C	51162	B210204-04	

SCALE 2:1 SHEET

5.8 DISPLAY PROCESSOR BOARD

The display processor samples the drive voltages applied to the YIG oscillators in order to generate a voltage which is proportional to frequency and can be displayed on the instrument front panel.

IC 1 and IC 3 sample the F1-F2 drive voltge applied to the board. IC 2 and IC 4 do the same function for the M1-M2 drive voltage. IC 5 samples the voltage for the M0 marker frequency display.

IC 7D is a differential amplifier and its output is delta F = F2-F1. IC 7B is a differential amplifier and its output is delta M = M2-M1. IC 7A and IC 7C perform the function (F1+F2)/2 = F0 which is used in the delta F sweep mode.

IC 8 is an ANALOG SWITCH (FET switch) and selects the desired input to the summing amplifier IC 11. R20 and R21 are used to add an offset to the summing amplifier IC 11. e.g. for a 2-18.5 GHz sweeper the following takes place:

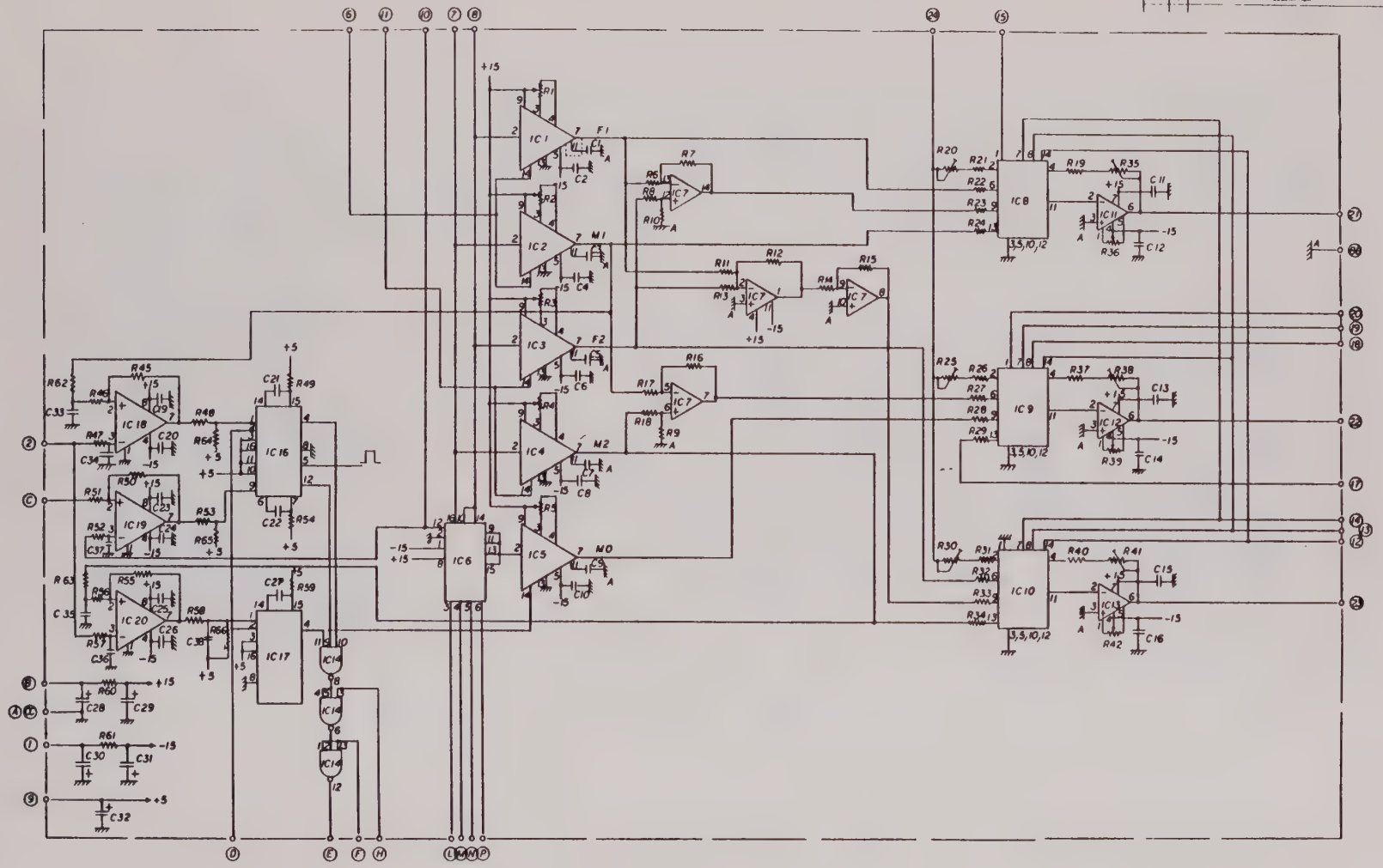
If the F1 control and F2 controls are set to their end limits, the F1-F2 drive voltage is 0 to +10V.

The F1 sample and hold circuit (IC1) will have 0 V output and the F2 S/H circuit (IC3) will have a +10V output.

The output of IC11 will be proportional to F1 and will be 0.2V (Scale factor 0.100V/GHz). This offset is supplied by the +10V refr. supply (applied on edge connector pin 24) and R20, R21.

The output of IC13 will be 1.850 volts which is the F2 display voltage.

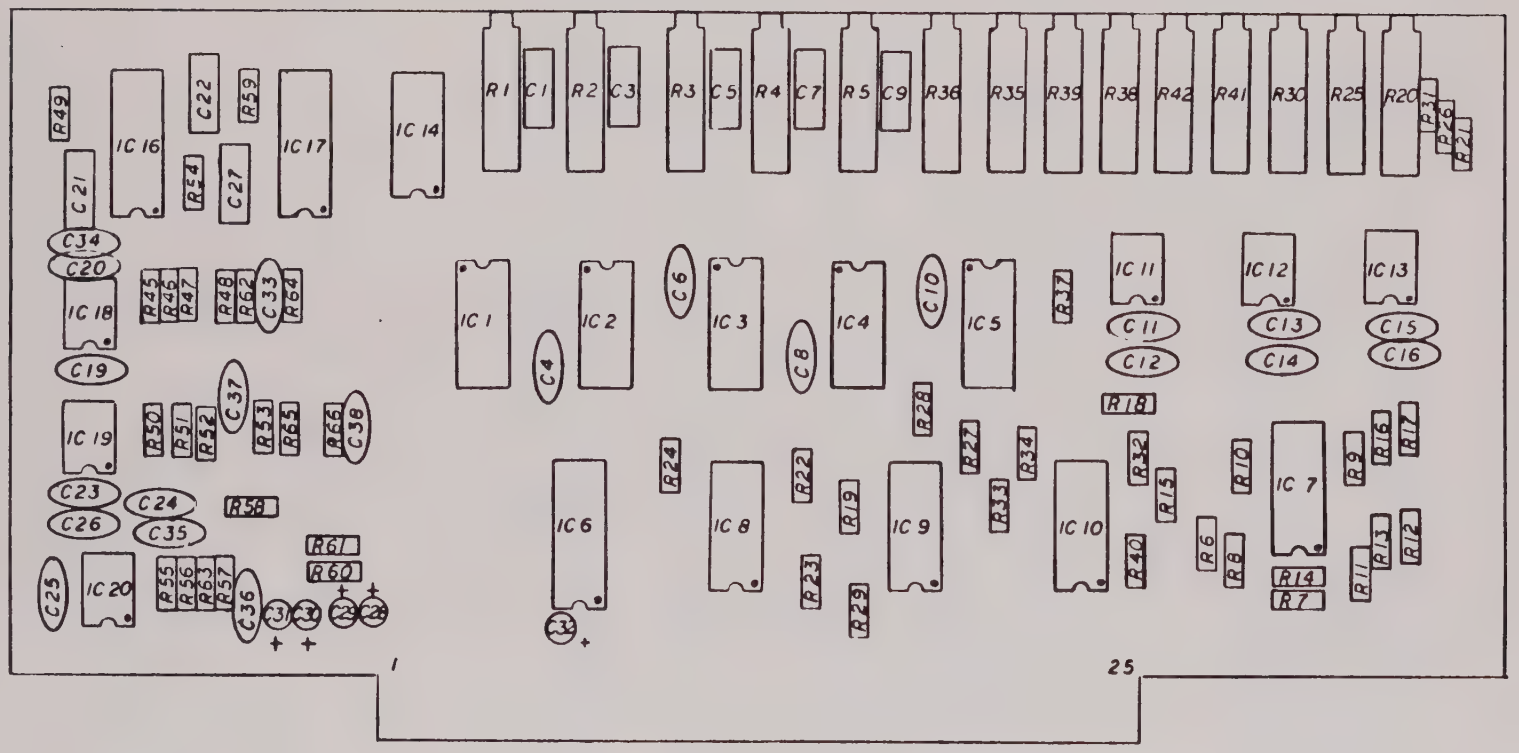
IC9 and IC12 perform the same function as IC8 and IC11.
The FET switches, IC 8,9,and 10 are digitally controlled to select the proper inputs for the summing amplifiers IC 11,12 and 13 depending on the operating mode selected.
IC 18,19 and 20 are voltage comparitors to generate markers M1, M0 and M2. In FULL SWEEP MODE, IC18 compares the sampled M1 voltage to the 0 to +10V sweep voltage applied to pin 2 off the board connector. When in any other sweep mode, the sampled M1 voltage is compared to the F1-F2 drive voltage. When the two voltages are equal, IC 16A (one-shot) gets triggered and generates the M1 marker pulse.
IC 20 functions in a similar way for marker M2. IC 19 which generates the M0 marker compares the sweep voltage 0 to +10V to the 0 to +10V generated by the F0/M0 control. When both voltages are equal, IC 16B (one shot) generates a marker pulse.
The M0 marker pulse is applied to the sample and hold circuit IC5 to sample the appropriate sweep voltage in order to generate the M0 marker frequency. In FULL SWEEP MODE, the 0 to +10 sweep voltage is applied to IC5 through the analog switch IC6. In F1-F2 sweep the F1-F2 drive voltage is selected by IC6 and in M1-M2 sweep mode, the M1-M2 drive voltage is applied.
IC14 combines all three marker pulses. Through pin H, the markers can be inhibited, which takes place in the delta F sweep mode.



LAST USED : IC 20, R66, C38

UNUSED : C17,18 ; R43,44 ; IC15

	INTEGRA
MSG-2100	DISPLAY PROCESSOR
APPLICATION	DO NOT SCALE DRAWING
DRAWN PM 8 13 80	SIZE D · FSCM NO 51162 · DWG NO B110203-05 · REV A



QTY REQD	CODE IDENT	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	MATERIAL SPECIFICATION

PARTS LIST

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ARE
FRACTIONS DECIMALS ANGLES
.XX ±
.XXX ±

CONTRACT NO

	APPROVALS	DATE
DRAWN	P M	8-5-80
CHECKED		
ISSUED		

MATERIAL

FINISH

DO NOT SCALE DRAWING

INTEGRA

DISPLAY PROCESSOR

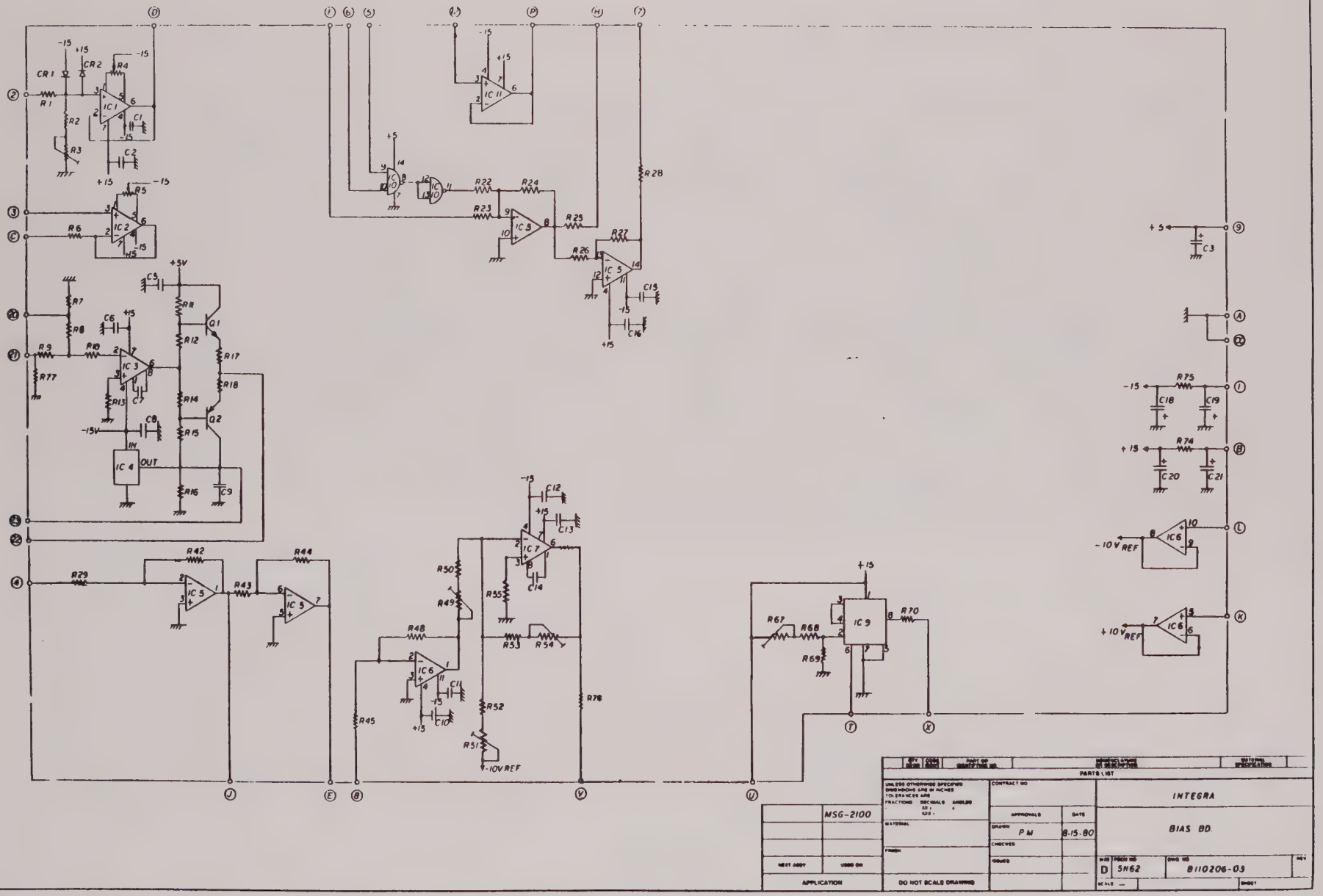
SIZE	FSCM NO.	DWG. NO.	REV
C	51162	B210203-05	A

SCALE 2:1 SHEET

	MSG-2100
NEXT ASSY	USED ON
APPLICATION	

5.9 BIAS BOARD

IC 1 on the bias board is a buffer amplifier for the external sweep input. R1, R2 and R3 form an input voltage divider.
IC 2 is a buffer amplifier (gain +1) for the sweep output signal.
The FM driver consists of IC 3, Q1 and Q2. IC 3 functions as an inverting amplifier and Q1 and Q2 form the output stage.
Pin 22 and 20 are connected to the oscillator FM coil and R7 serves as a current sense resistor. The FM driver input signal is applied to pin 21.
IC 4 is a voltage regulator and generates -5V (available on pin 23).
IC 5A and IC 5B function as inverters but can be used as linearizers if required.
IC 5C and IC 5D are inverters and used to generate the Z-axis output signal and the Inverted Z-axis output signal.
IC 11 serves as a buffer amplifier with a gain of +1.
IC 6 and IC 7 form the bias voltage programmer for the YIG-Gunn oscillator. R51, 52, 53 and 54 set the voltage at F min of the Gunn oscillator. The sweep voltage 0 to -10V is inverted in IC 6A and then applied to IC 7 through R49 and R50 (slope control for the bias). The IC 7 output is applied to the bias regulator through R76 and reduces the bias voltage with increasing frequency.
IC 9 is an overvoltage protection circuit. The bias voltage to be monitored is applied to IC 9 through R67, R68 and R69. The output of IC 9 is applied to the gate of a silicon controlled rectifier through R70.
R67 sets the threshold voltage.
IC 6B and IC 6C are buffer amplifiers for the refrence voltages.
Relay K1 is used to connect a filter capacitor across the YIG main coil in CW mode and MAN sweep mode.



	MSG-2100			INTEGRA	
				BIAS BD.	
				D 5N62	B110206-03
NEXT ASSY	USED ON				
APPLICATION	DO NOT SCALE DRAWING				

PARTS LIST

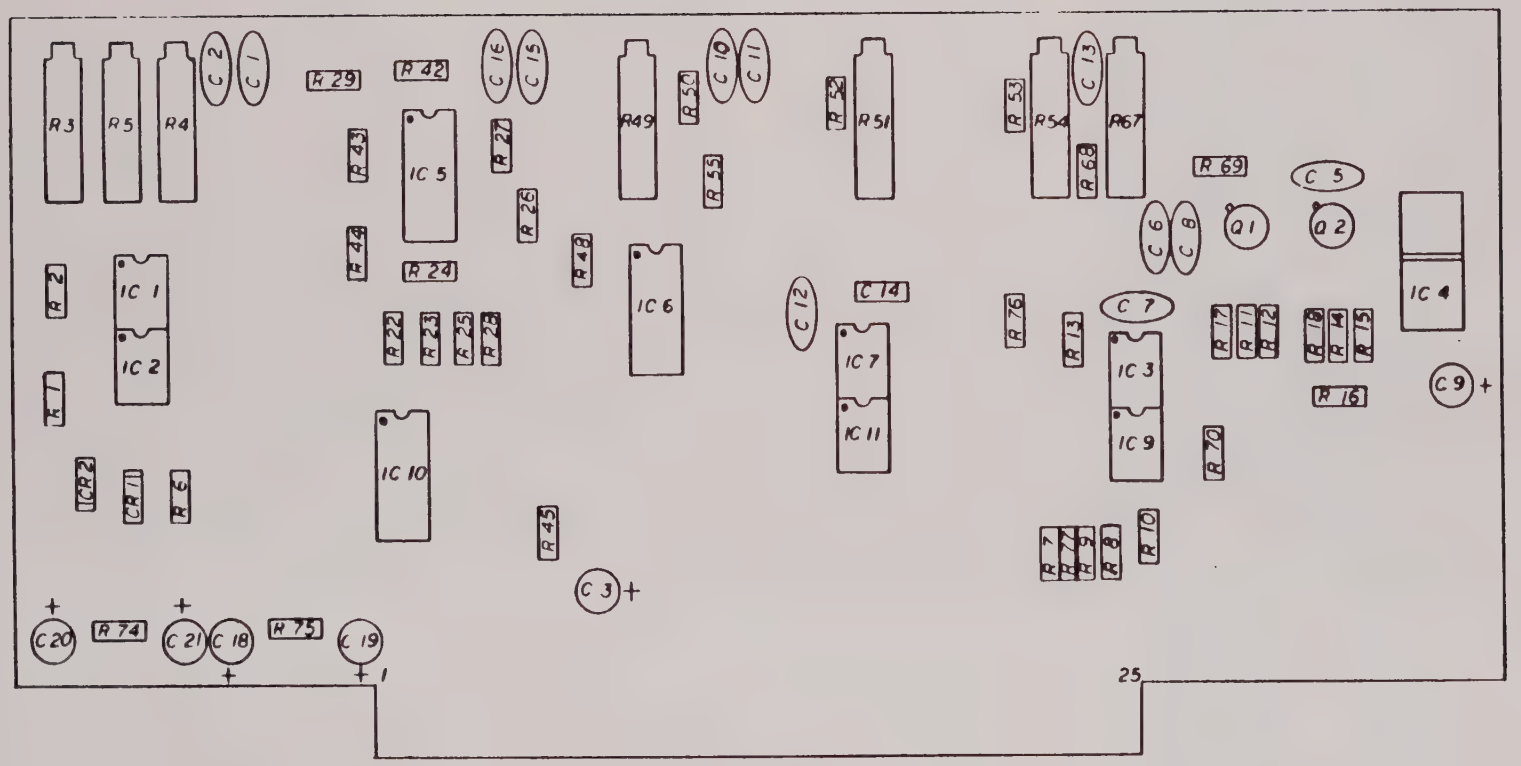
CONTRACT NO

APPROVALS DATE

DRAWN P M 8-15-80

CHECKED

ISSUED



NOTE:
ADD JUMPER FROM IC 5 PIN 1 TO J OF BOARD

QTY REQ'D	PSCB NO.	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION			MATERIAL SPECIFICATION	
			PARTS LIST				

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ARE: FRACTIONS ±1/32 DECIMALS .XX ±.01 .XXX ±.005 ANGLES ±1°

CONTRACT NO.

	APPROVALS	DATE
DRAWN	N.P.	8/20/80
CHECKED		
ISSUED		

MATERIAL

FINISH

DO NOT SCALE DRAWING

	MSG-2100
NEXT ASSY	USED ON
APPLICATION	

INTEGRA

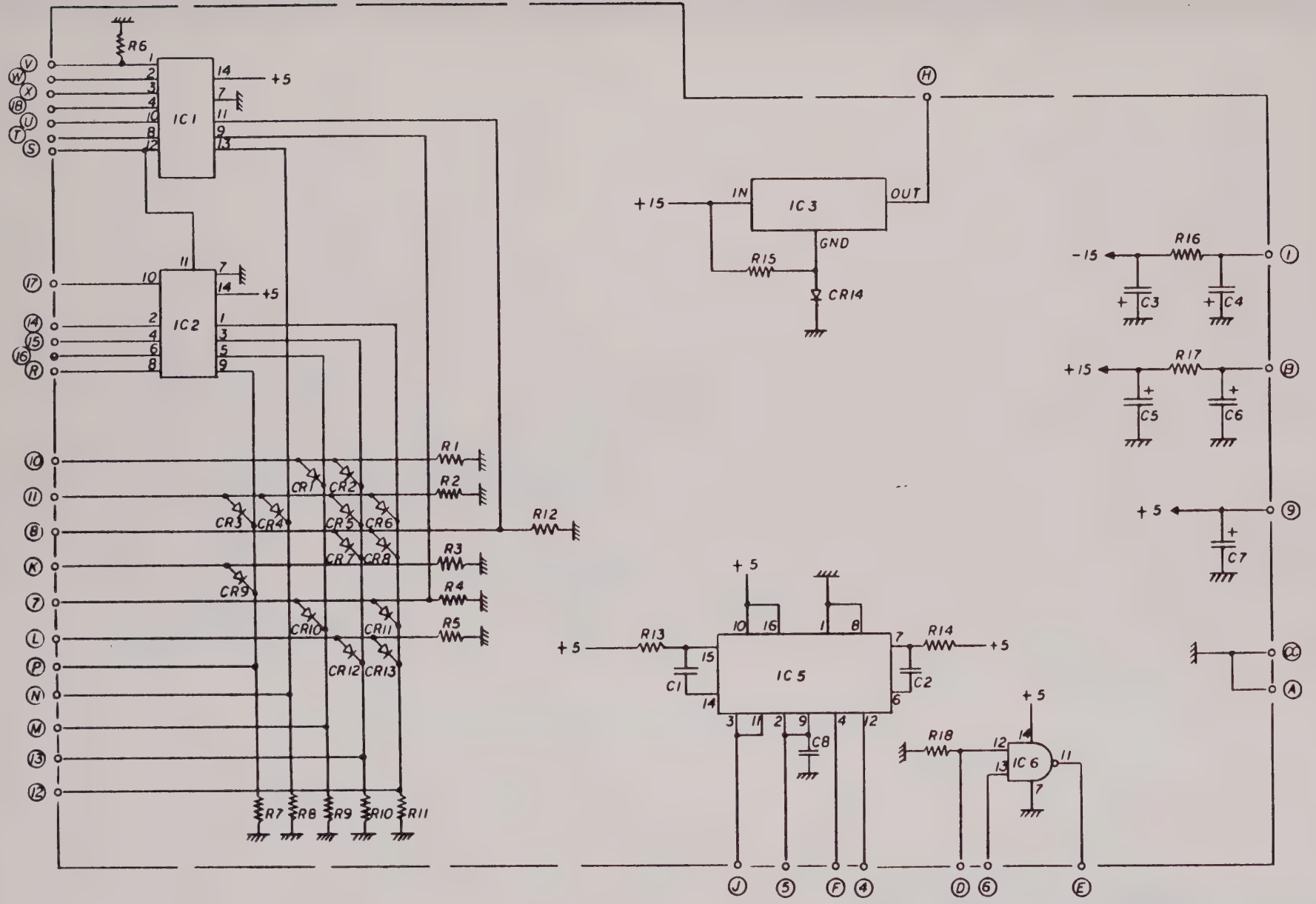
BIAS BOARD

SIZE C | PSCB NO. 51162 | DWG NO. B210206-03 | REV

SCALE 2:1 | SHEET

5.10 SIGNAL PROCESSOR

IC3 is a voltage regulator which generates +5.7V on pin H. This voltage is used to drive the decoding matrix made up from CR1-CR13. The front panel functions are decoded by this matrix and buffered by IC2. (non-inverting buffer)
IC1 is a hex inverter for control signals.
IC5 is a dual one-shot used to generate the sampling pulses for the display sampling and hold circuits
IC6 generates a display trigger pulse to initiate a new reading cycle by the digital frequency displays. On pin 6 the sample and hold trigger pulse is present and on pin D a display enable signal is present when in AUTO MODE and CW MODE.



QTY REQD	CODE IDENT	PART OR IDENTIFYING NO	NOMENCLATURE OR DESCRIPTION	MATERIAL SPECIFICATION

PARTS LIST

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES. TOLERANCES ARE: FRACTIONS ±; DECIMALS .XX ±; .XXX ±; ANGLES ±

CONTRACT NO.

APPROVALS	DATE
DRAWN P M	8-13-80
CHECKED	
ISSUED	

MATERIAL

FINISH

DO NOT SCALE DRAWING

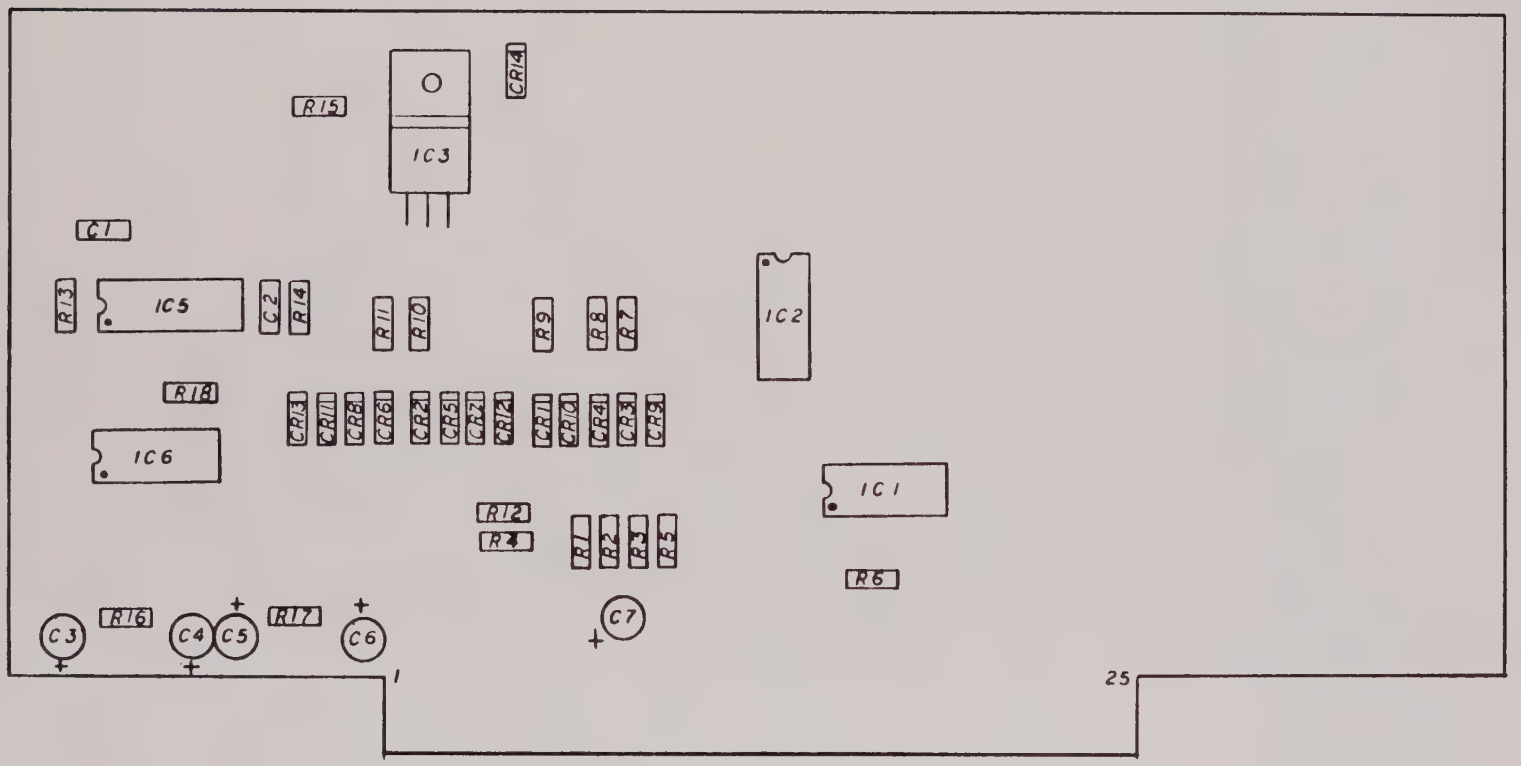
NEXT ASSY	USED ON
APPLICATION	MSG-2100

INTEGRA

SIGNAL PROCESSOR

SIZE	FSCM NO	DWG NO	REV
C	51162	8110213-01	A

SCALE — SHEET



QTY REQD	CODE IDENT	PART OR IDENTIFYING NO	NOMENCLATURE OR DESCRIPTION	MATERIAL SPECIFICATION

PARTS LIST

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ARE
FRACTIONS DECIMALS ANGLES
.X ±
.XXX ±

CONTRACT NO.

APPROVALS	DATE
DRAWN PM	8·5·80
CHECKED	
ISSUED	

MATERIAL

FINISH

DO NOT SCALE DRAWING

	MSG-2100
NEXT ASSY	USED ON

APPLICATION

INTEGRA

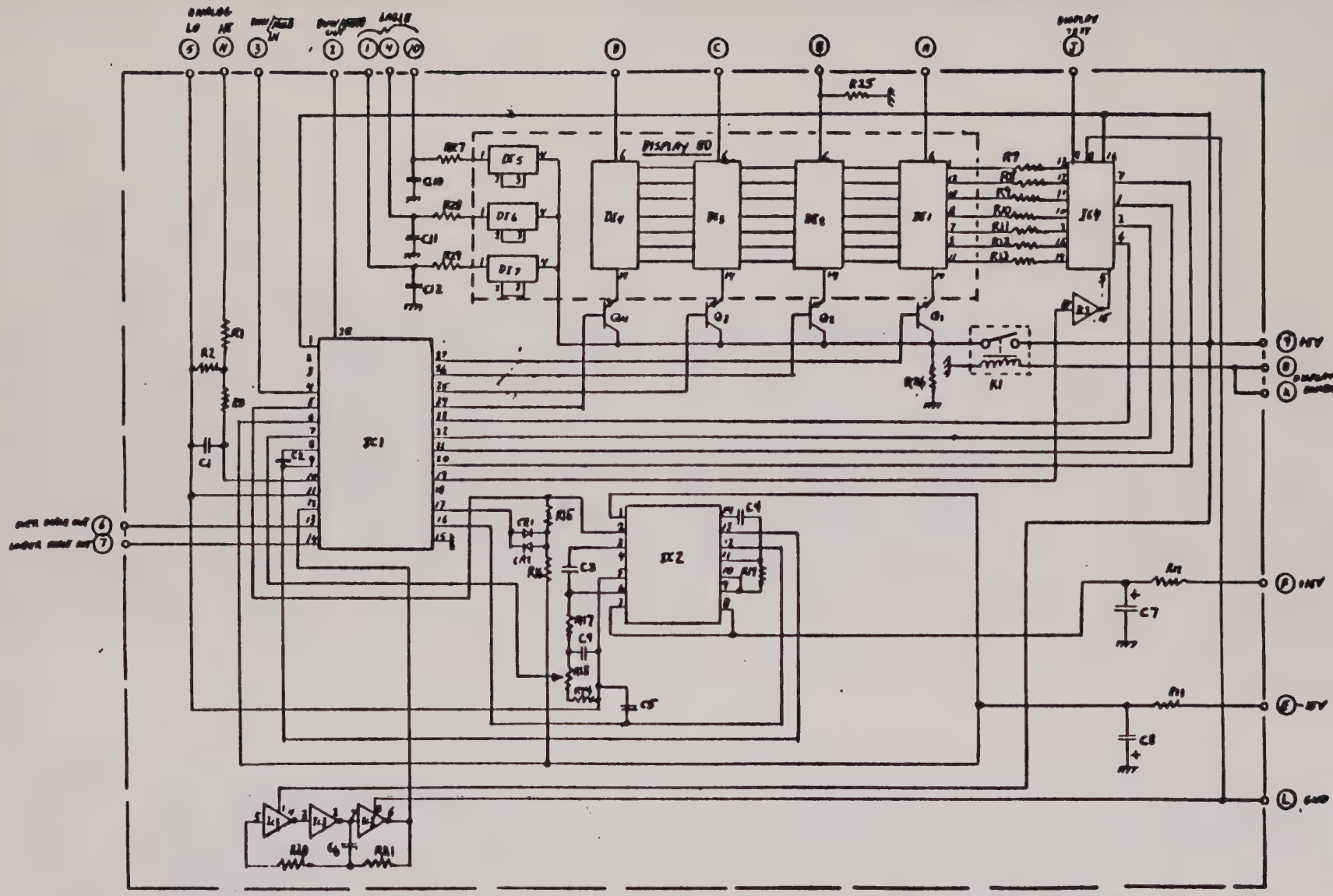
SIGNAL PROCESSOR

SIZE	FSCM NO	DWG NO	REV
C	51162	B210213-01	A

SCALE 2:1 SHEET

5.11 DISPLAY MODULE

The display module is a 4 digit digital voltmeter used to display the frequency information. IC 1 and IC 2 form a dual slope integration type A/D converter. IC 3 is the internal clock used for counting. R 18 is the reference voltage adjustment and is used for full scale calibration. IC 4 is a BCD to seven segment decodes. Q 1 through Q 4 are digit strobe transistors. D 1 - D4 are sevem segment displays with common anode. D 5 - D 7 are LED indicators.


ANALOG
LO
HI
DISPLAY
UNIT
DISPLAY BD
R25
IC1
IC2
C1
C2
C3
C4
C5
C7
C8
C9
C10
C11
C12
R1
R2
R3
R16
R17
R18
R19
R20
R21
R22
R23
R24
R26
R27
DS5
DS6
DS7
Q1
Q2
Q3
Q4
J1
J2
J3
J4
J5
J6
J7
J8
J9
J10
J11
J12
J13
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J38
J39
J40

REVISIONS			
REV.	DESCRIPTION	DATE	APPROVED

	QTY REQD	CODE IDENT	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	MATERIAL SPECIFICATION

PARTS LIST

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ARE:
FRACTIONS ± DECIMALS .XX ± .XXX ± ANGLES ±

MATERIAL

FINISH

DO NOT SCALE DRAWING

CONTRACT NO.

APPROVALS	DATE
DRAWN Wm F	6-17-80
CHECKED	
ISSUED	

INTEGRA

DISPLAY BD. (MOD)

SIZE	FSCM NO.	DWG. NO.	R
A	51162	B2-10280-01	

SCALE

SHEET

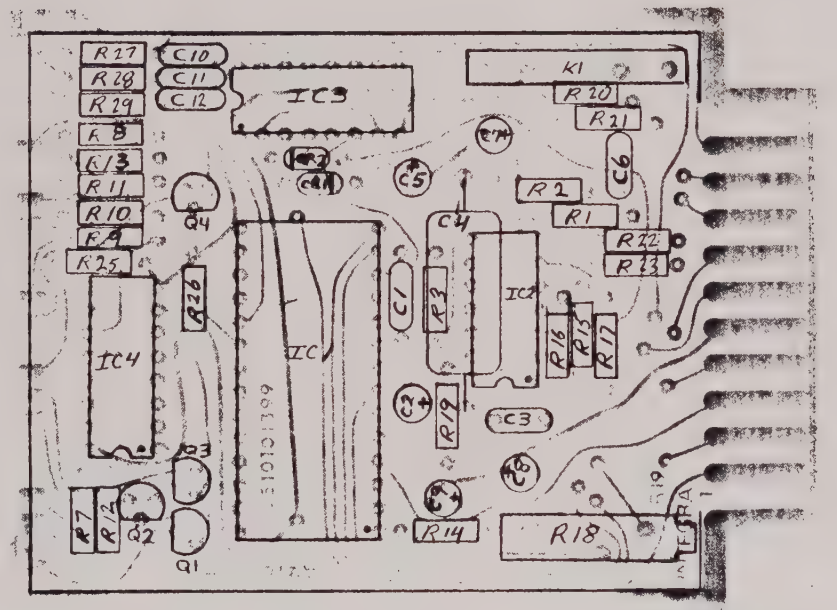
NEXT ASSY	USED ON
	MSG 2100

APPLICATION

DWG. NO.	SH	REV.

REVISIONS

REV	DESCRIPTION	DATE	APPROVED



	QTY REQD	FSCM NO	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	MATERIAL SPECIFICATION

PARTS LIST

	MSG 2100
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ARE:
FRACTIONS ± DECIMALS .XX ± .XXX ± ANGLES ±

MATERIAL

FINISH

DO NOT SCALE DRAWING

CONTRACT NO.

APPROVALS	DATE
DRAWN P.M.	7-31-81
CHECKED	
ISSUED	

INTEGRA

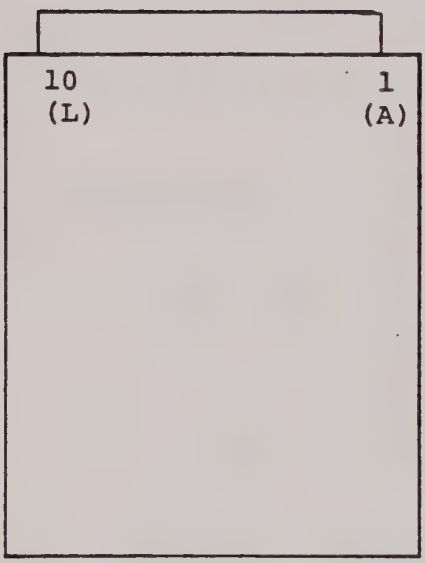
CONVERTER

SIZE	FSCM NO.	DWG. NO.	REV.
B	51162	B110281-01	

SCALE ~2:1 SHEET

BISHOP GRAPHICS, INC.
REORDER NO. 20510

Digital Display Connection



Function
Indicators

INPUTS & OUTPUTS

PIN #	FUNCTIONS
E	-15V
F	+15V
H	ANALOG HI INPUT
	(IV for 10.00 Display)
K	DISPLAY ENABLE (+5V=enable)
L	(Grd of 5V-supply)
1	Lower Function Indicator
	(0 V = enable)
3	Display Trigger
4	Mid-position Function Indicator
	(0 V = enable)
5	Analog LO (return)
9	+5V - supply
10	Upper Function Indicator
	(0 V = enable)

DIGITAL DISPLAY CONNECTIONS

7. CALIBRATION

7.1 VOLTAGE CALIBRATION PROCEDURE

NOTE:
This calibration only required when boards A1 through A5 have been replaced or repaired.

1.	Set +10V - reference	A2-25	Adj: A2-R78 Set to +10.000V
2.	Set -10V - reference	A2-13	Adj: A2-R82 Set to -10.000V
3.	Set internal sweep	A2-24	Adj: A2-R59 in slowest sweep mode to +10.010V

CONNECT VOLTAGE CALIBRATION STANDARD TO EXT SWEEP, SELECT EXT

4.	Set EXT sweep gain	A2-24	Adj: A4-R4 for 0 with 0 V input
5.	Set EXT sweep gain	A2-24	Adj: A4-R3 for +10.000V with +10V input
6.	Set sweep out offset	SWEEP OUT	Adj: A4-R5 fpr 0.000V with 0 V input
7.	Set F1-F2 controls F1 to CCW, F2 to CW	A2-12	Adj: A2-R4 for +10.000V with +10V @ input
8.	F1 to CW, F2 to CW	A2-12	Adj: A2-R1 for +10.000V with +10V input
9.	Set M1-M2 controls M1 to CCW, M2 to CW	A2-18	Adj: A2-R13 for +10.000V with +10V input
10.	M1 to CW, M2 to CW	A2-18	Adj: A2-R17 for +10.000V with +10V input.
11.	Set F0/M0 control, F0/M0 to CW, F0 Vernier to CW	A2-Y	Adj: A2-R51 for +10.000V
12.	Check F0 Vernier F0-M0 to CW, F0-Vernier to CCW	A2-Y	With x1: voltage +9.68V With x0.1: voltage +9.971V
13.	Set delta F control delta F to CW	A2-AA	Adj: A2-R60 for equal + voltage when EXT input switched from 0 to +10V

Disconnect J3 pin 7 and 8. Disconnect J3-24. Connect jumper to J3-7 and J3-8 and connect to EXT voltage calibrator. Select F1-F2 mode, F1-F2 display, AUTO and fastest sweep. Voltage calibrator set to 0 V.

14.	Set S/H offset	A3-IC 1 pin 7	Adj: A3R1 for 0 volts
15.	" " "	A3-IC 2 pin 7	Adj: A3R2 for 0 volts
16.	" " "	A3-IC 3 pin 7	Adj: A3R3 for 0 volts
17.	" " "	A3-IC 4 pin 7	Adj: A3R4 for 0 volts
18.	" " "	A3-IC 5 pin 7	Adj: A3R5 for 0 volts
19.	Set Display Amp Zero	A3-21	Adj: A3-R36 for 0 volts
20.	" " " "	A3-22	Adj: A3-R59 " "
21.	" " " "	A3-23	Adj: A3-R42 " "

SET VOLTAGE CALIBRATOR TO +10.000V

22. Set Display Amp Gain	A3-21	Adj: A3-R35	For voltage corres. to.
23. " " " "	A3-22	Adj: A3-R38	F max-F min
24. " " " "	A3-23	Adj: A3-R41	10

SET VOLTAGE CALIBRATOR TO 0 V, RECONNECT J3-24

25. Set Display #1 for F min.	Adj: A3-R20	For F min on frequency.
26. " " #2 "	Adj: A3-R25	Displays on front panel.
27. " " #3 "	Adj: A3-R30	

SET VOLTAGE CALIBRATOR TO +10V

28. Set Display #1 for F max.	Adj: A3-R35	For F max on frequency.
29. " " #2 "	Adj: A3-R38	displays on front panel
30. " " #3 "	Adj: A3-R41	

31. Repeat last two steps until both correct.
32. This completes the voltage calibration. Disconnect jumper wire and reconnect J3-7 and 8.

7.2 MSG-2100 SERIES FREQUENCY CALIBRATION

EQUIPMENT REQUIRED

1. Frequency counter, HP 5342A or equivalent.
2. MSG-COVER-TEST-1.

PROCEDURE

1. Remove units standard top cover & replace with test cover.
2. Turn unit on & select:

SWEEP MODE-FULL

MODE-AUTO

TRIGGER-INT

TIME-.1-.01

Insure RF switch is in on position and allow unit to warm-up for approximately 1/2 hour.

3. Connect the frequency counter to the sweeper RF OUTPUT.
   *NOTE: Not all sweepers have 4 oscillators. This test covers all sweepers.
4. Select sweep mode: CW.
5. Turn F0/M0 control completely CCW. Turn CW until CR2 lights. Now turn CCW until CR2 just goes out.
6. Adjust oscillator #1 high end adjustment pot (labeled on top cover) so the counter reading matches the sweeper display reading.
7. Turn the FO/MO control completely CCW.

8. Adjust oscillator #1 low end adjustment pot so the counter reading matches the sweeper display reading.
9. Repeat steps 5-8 untill correct.
10. Turn the FO/MO CW until CR3 lights. Now turn CCW until CR3 just goes out.
11. Adjust oscillator #2 high end adjustment pot (labeled on top cover) so the counter reading matches the sweeper display reading.
12. Turn the FO/MO control CCW until CR2 goes out. Now turn CW until CR2 just lights.
13. Adjust oscillator #2 low end adjustment pot so the counter reading matches the sweeper display reading.
14. Repeat steps 10-13 untill correct.
15. Turn the FO/MO control CW until CR4 lights. Now turn CCW until CR4 just goes out.
16. Adjust oscillator #3 high end adjustment pot (labeled on top cover) so the counter reading matches the sweeper display reading.
17. Turn the FO/MO control CCW until CR3 goes out. Now turn CW until CR3 just lights.
18. Adjust oscillator #3 low end adjustment pot so the counter reading matches the sweeper display reading.
19. Repeat steps 15-18 untill correct.
20. Turn FO/MO control fully CW.

21. Adjust oscillator #4 high end adjustment pot (labeled on top cover) so the counter reading matches the sweeper display reading.
22. Turn the FO/MO control CCW until CR4 goes out. Now turn CW until CR4 just lights.
23. Adjust oscillator #4 low end adjustment pot so the counter reading matches the sweeper display reading.
24. Repeat steps 20-23 untill correct.
25. Turn unit off and remove test cover.

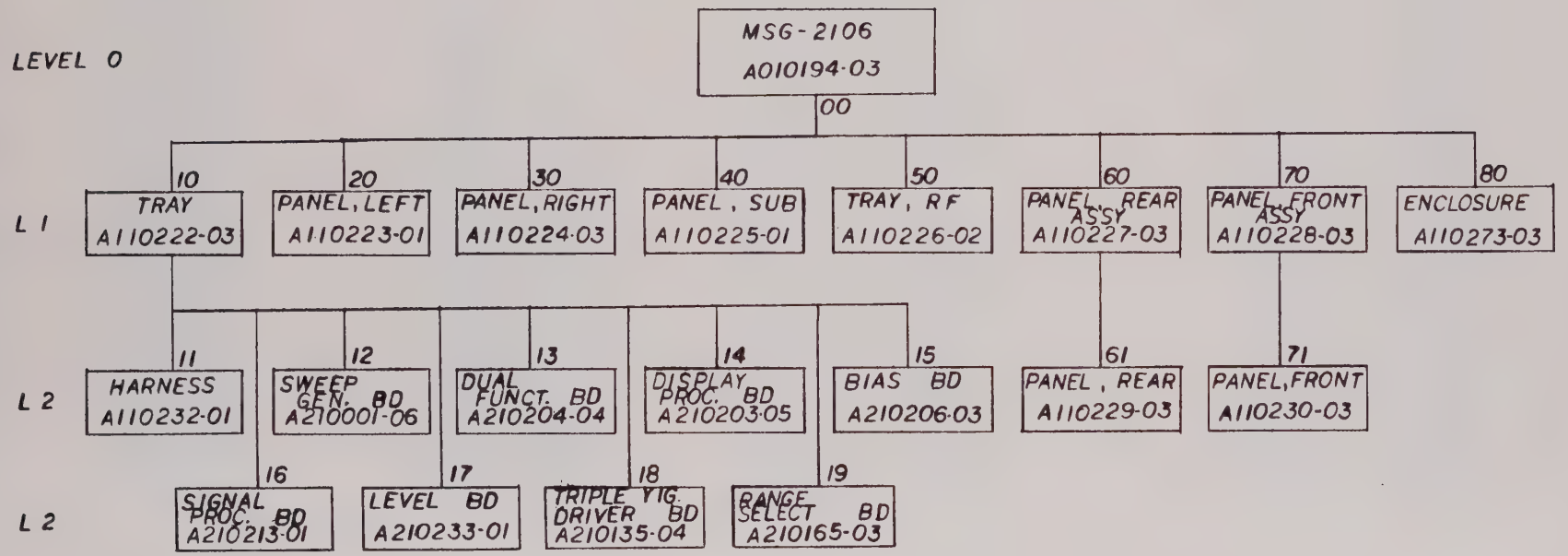
THIS COMPLETES THE FREQUENCY CALIBRATION.

8.0 APPLICATION NOTES

9.0 PARTS LIST

DWG. NO.	SH	REV.

REVISIONS			
REV.	DESCRIPTION	DATE	APPROVED



QTY REQD	FSCM NO.	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	MATERIAL SPECIFICATION

PARTS LIST

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ARE: FRACTIONS ± DECIMALS .XX ± .XXX ± ANGLES ±	CONTRACT NO.		INTEGRA
MATERIAL	APPROVALS	DATE	PRODUCT STRUCTURE
	DRAWN D.M.	10-8-81	
FINISH	CHECKED		SIZE B FSCM NO. 51162 DWG. NO. B710194-03 REV.
	ISSUED James Edmond	10-9-81	
NEXT ASSY / USED ON			SCALE SHEET
APPLICATION	DO NOT SCALE DRAWING		

BISHOP GRAPHICS, INC.
REORDER NO. 20510

INTEGRA INC
ENGINEERING PARTS LIST

ASSEMBLY # A010194-03
USED ON MSG-2106
NEXT ASSEMBLY END ITEM
TITLE MSG-2106

DATE RELEASED

1 2 TC	DATE	7 CC	9 PART NUMBER	17 SUFF	18 REV	19 DESCRIPTION	40 QUA	43 U/M	44 SRC	45 E/F	REF DESIGNATION	63 M	64 T/P	70 L	71 NEXT ASSY	80 C
		AO	10194-03			MSG-2106	010	E	C	0001		L	00	0	END ITEM	5
		A1	10273-03			ENCLOSURE	010	E	7	0001		L	00	1	10194-03	5
		A2	10306-01			DVM	010	E	S	0001		L	00	1	10194-03	5
		A2	10306-02			DVM	010	E	S	0001		L	00	1	10194-03	5
		A2	10306-03			DVM	010	E	S	0001		L	00	1	10194-03	5
		B6	10101707			MANUAL	010	E	7	0001		L	00	1	10194-03	5
		31	10100137			CORD, POWER	010	E	7	0001		L	00	1	10194-03	5
		41	10100270			KNOB	090	E	7	0001		L	00	1	10194-03	5
		41	10100272			CAP	090	E	7	0001		L	00	1	10194-03	5
		41	10100281			RETAINER, STRAP	040	E	7	0001		L	00	1	10101776	5
		41	10100283			FEET	050	E	7	0001		L	00	1	10194-03	5
		41	10100329			EXTRU, FRONT	020	E	7	0001		L	00	1	10194-03	5
		41	10100778			KNOB	010	E	7	0001		L	00	1	10194-03	5
		41	10100779			CAP	010	E	7	0001		L	00	1	10194-03	5
		41	10101224			PANEL, DECORATIVE	020	E	7	0001		L	00	1	10194-03	5
		41	10101225			STRAP	020	E	7	0001		L	00	1	10194-03	5
		41	10101229			COVER, TOP	010	E	7	0001		L	00	1	10194-03	5
		41	10101230			COVER, BOTTOM	010	E	7	0001		L	00	1	10194-03	5
		41	10101619			LABEL, S/N	010	E	7	0001		L	00	1	10194-03	5
		41	10101776			RETAINER, STRAP	040	E	3	0001		L	00	1	10194-03	5
		42	10303-16			SCREW, #6-3/4 BLK	040	E	7	0001		L	00	1	10194-03	5
		42	10100277			SCREW, #6-3/4	040	E	7	0001		L	00	1	10194-03	5
		42	10100284			SCREW, #6 ST	050	E	7	0001		L	00	1	10194-03	5
		42	10100334			NUT, HEX #8	040	E	7	0001		L	00	1	10194-03	5
		42	10100335			SCREW, SPOTWELD	040	E	7	0001		L	00	1	10194-03	5
		42	10100337			SCREW, #8-1/2	040	E	7	0001		L	00	1	10194-03	5
		43	10100278			WASHER, NYLON	040	E	7	0001		L	00	1	10194-03	5
		54	10101711			CONTAINER, SHIP	010	E	7	0001		L	00	1	10194-03	5

INTEGRA INC
ENGINEERING PARTS LIST

ASSEMBLY # A110222-03
USED ON MSG-2106
NEXT ASSEMBLY A010194-03
TITLE TRAY

DATE RELEASED

1 2 TC	DATE	7 9 CC	PART NUMBER	17 SUFF	18 REV	19 DESCRIPTION	40 QUA	43 U/M	44 SRC	45 E/F	REF DESIGNATION	63 M	64 T/P	70 L	71 NEXT ASSY	80 C
		A1	10222-03			TRAY	010	E	C	0001		L	10	1	10194-03	5
		13	10100138			C ELEC 5500 UF	070	E	7	0001		L	10	2	10222-03	5
		13	10101900			C ELEC 10 UF	020	E	7	0001		L	10	2	10222-03	5
		13	10101901			C ELEC 1 UF	020	E	7	0001		L	10	2	10222-03	5
		15	10100153			RECT, VS247	030	E	7	0001	CR 1,2,3	L	10	2	10222-03	5
		15	10101633			DIODE, IN4004	040	E	7	0001		L	10	2	10222-03	5
		19	10100042			IC, LAS1815	010	E	7	0001	UR 1	L	10	2	10222-03	5
		19	10100044			IC, LAS1505	010	E	7	0001	UR 2	L	10	2	10222-03	5
		26	10101311			RELAY	010	E	7	0001		L	10	2	10222-03	5
		27	10101040			R MF 2.21K	010	E	7	0001	R 22	L	10	2	10222-03	5
		29	10101503			TRANSFORMER, 5357A	010	E	7	0001	T 1	L	10	2	10222-03	5
		29	10101504			TRANSFORMER, 5358	010	E	7	0001	T 2	L	10	2	10222-03	5
		41	10100052			GUIDE, CARD	160	E	7	0001		L	10	2	10222-03	5
		41	10100261			TERMINAL	100	E	7	0001		L	10	2	10222-03	5
		41	10100425			SPACER	020	E	7	0001		L	10	2	10222-03	5
		41	10101314			RETAINER, RELAY	010	E	7	0001		L	10	2	10222-03	5
		42	10004-05			SCREW, #4-5/8	060	E	7	0001		L	10	2	10222-03	5
		42	10007-03			SCREW, #6-3/8	260	E	7	0001		L	10	2	10222-03	5
		42	10007-04			SCREW, #6-1/2	200	E	7	0001		L	10	2	10222-03	5
		42	10100070			NUT, HEX #6	040	E	7	0001		L	10	2	10222-03	5
		42	10100175			NUT, HEX #4	060	E	7	0001		L	10	2	10222-03	5
		41	10100665			COVER, TRANS	010	E	7	0001	UR 1	L	10	2	10222-03	5
		43	10100050			BRACKET	070	E	7	0001		L	10	2	10222-03	5
		43	10100074			WASHER, #6 FL	400	E	7	0001		L	10	2	10222-03	5
		43	10100075			WASHER, #6 SPL	460	E	7	0001		L	10	2	10222-03	5
		43	10100143			MOUNT	020	E	7	0001		L	10	2	10222-03	5
		43	10100144			LUG	080	E	7	0001		L	10	2	10222-03	5
		43	10100179			WASHER, #4 FL	060	E	7	0001		L	10	2	10222-03	5
		43	10100180			WASHER, #4 SPL	060	E	7	0001		L	10	2	10222-03	5
		43	10100188			INSULATOR	020	E	7	0001		L	10	2	10222-03	5
		72	10101101		A	BRKT, CARD LF	010	E	7	0001		L	10	2	10222-03	5
		72	10101102		A	BRKT, CARD RT	010	E	7	0001		L	10	2	10222-03	5
		72	10101105		D	TRAY	010	E	7	0001		L	10	2	10222-03	5
		72	10101113		B	SPACER	060	E	7	0001		L	10	2	10222-03	5
		73	10101377			COVER, HV	010	E	7	0001		L	10	2	10222-03	5

INTEGRA INC
ENGINEERING PARTS LIST

ASSEMBLY # A210232-01
USED ON MSG-2106
NEXT ASSEMBLY A210222-03
TITLE HARNESS

DATE RELEASED _____

1 2 TC	DATE	7 9 CC	PART NUMBER	17 SUFF	18 REV	19 DESCRIPTION	40 QUA	43 U/M	44 SRC	45 E/F	REF DESIGNATION	63 M	64 T/P	70 L	71 NEXT ASSY	80 C
		A2	10232-01			HARNESS	010	E	C	0001		L	11	2	10222-03	5
		15	10101633			DIODE, IN4004	010	E	7	0001		L	11	3	10232-01	5
		27	10101365			R CARB 47	010	E	7	0001		L	11	3	10232-01	5
		31	10100250			WIRE, #26 BLK	500	F	7	0001		L	11	3	10232-01	5
		31	10100251			WIRE, #26 BRN	500	F	7	0001		L	11	3	10232-01	5
		31	10100252			WIRE, #26 RED	500	F	7	0001		L	11	3	10232-01	5
		31	10100253			WIRE, #26 ORG	500	F	7	0001		L	11	3	10232-01	5
		31	10100254			WIRE, #26 YEL	500	F	7	0001		L	11	3	10232-01	5
		31	10100255			WIRE, #26 GRN	500	F	7	0001		L	11	3	10232-01	5
		31	10100256			WIRE, #26 BLU	500	F	7	0001		L	11	3	10232-01	5
		31	10100257			WIRE, #26 VIO	500	F	7	0001		L	11	3	10232-01	5
		31	10100258			WIRE, #26 GRY	500	F	7	0001		L	11	3	10232-01	5
		31	10100259			WIRE, #26 WHT	500	F	7	0001		L	11	3	10232-01	5
		31	10100260			WIRE, #20 BLK	500	F	7	0001		L	11	3	10232-01	5
		31	10100262			WIRE, #20 RED	500	F	7	0001		L	11	3	10232-01	5
		31	10100263			WIRE, #20 BLU	500	F	7	0001		L	11	3	10232-01	5
		31	10100264			WIRE, #20 GRN	500	F	7	0001		L	11	3	10232-01	5
		41	10100005			CONN	080	E	7	0001		L	11	3	10232-01	5
		41	10100236			WRAP, TIE	990	E	7	0001		L	11	3	10232-01	5
		41	10100236			WRAP, TIE	800	E	7	0001		L	11	3	10232-01	5
		41	10101055			CONN	030	E	7	0001		L	11	3	10232-01	5
		41	10101312			SOCKET, RELAY	010	E	7	0001		L	11	3	10232-01	5
		41	10101373			CONN	010	E	7	0001		L	11	3	10232-01	5

INTEGRA INC
ENGINEERING PARTS LIST

ASSEMBLY # A210001-06
USED ON MSG-2106
NEXT ASSEMBLY A110222-03
TITLE SWEEP GENERATOR BOARD

DATE RELEASED _____

1 2 TC	DATE	7 9 CC	PART NUMBER	17 SUFF	18 REV	19 DESCRIPTION	40 QUA	43 U/M	44 SRC	45 E/F	REF DESIGNATION	63 M	64 T/P	70 L	71 NEXT ASSY	80 C
		A2	10001-06			SWEEP GEN BD	010	E	C	0001		L	12	2	10222-03	5
		13	10100088			C CER .01 UF	010	E	7	0001	C 1	L	12	3	10001-06	5
		13	10100158			C TANT 33 UF	010	E	7	0001	C 4	L	12	3	10001-06	5
		13	10100159			C TANT 330 UF	010	E	7	0001	C 5	L	12	3	10001-06	5
		13	10100160			C FILM .033 UF	010	E	7	0001	C 6	L	12	3	10001-06	5
		13	10101548			C FILM .56 UF	010	E	7	0001	C 2	L	12	3	10001-06	5
		13	10101900			C ELEC 10 UF	050	E	7	0001	C 13,14,15,16,17	L	12	3	10001-06	5
		13	10101904			C ELEC 3.3 UF	010	E	7	0001	C 3	L	12	3	10001-06	5
		15	10100016			DIODE, IN5231A	030	E	7	0001	CR 5, 6, 7	L	12	3	10001-06	5
		15	10100019			DIODE, IN4148	110	E	7	0001	CR 2,3,4,8,9,10, 11,13,14,17,18	L	12	3	10001-06	5
		15	10100183			DIODE, IN5240	010	E	7	0001	CR 1	L	12	3	10001-06	5
		15	10100184			DIODE, IN 5250	010	E	7	0001	CR 15	L	12	3	10001-06	5
		15	10101633			DIODE, IN4004	010	E	7	0001	CR 16	L	12	3	10001-06	5
		19	10100096			IC, SN7400N	010	E	7	0001	IC 8	L	12	3	10001-06	5
		19	10100116			IC, LM307CN	020	E	7	0001	IC 1,2	L	12	3	10001-06	5
		19	10100117			IC, SN7476N	010	E	7	0001	IC 5	L	12	3	10001-06	5
		19	10100118			IC, CA3046	010	E	7	0001	IC 6	L	12	3	10001-06	5
		19	10100120			IC, LM301AN	020	E	7	0001	IC 3,4	L	12	3	10001-06	5
		25	10100001		B	PCB	010	E	7	0001		L	12	3	10001-06	5
		27	10100093			R CARB 680	010	E	7	0001	R 43	L	12	3	10001-06	5
		27	10100094			R CARB 240	010	E	7	0001	R 12	L	12	3	10001-06	5
		27	10100105			R CARB 5.6K	010	E	7	0001	R 49	L	12	3	10001-06	5
		27	10100110			R CARB 10K	150	E	7	0001	R 5,20,21,23, 30-34,36,37,40-42,46	L	12	3	10001-06	5
		27	10100185			R CARB 68K	030	E	7	0001	R 1, 19, 22	L	12	3	10001-06	5
		27	10100186			R CARB 27	010	E	7	0001	R 4	L	12	3	10001-06	5
		27	10100187			R MF 1.00K	050	E	7	0001	R 7, 9, 10, 11, 14	L	12	3	10001-06	5
		27	10100189			R MF 3.57K	010	E	7	0001	R 15	L	12	3	10001-06	5
		27	10100190			R MF 100	010	E	7	0001	R 16	L	12	3	10001-06	5
		27	10100192			R CARB 2K	030	E	7	0001	R 17, 18, 24	L	12	3	10001-06	5
		27	10100193			R MF 8.25K	010	E	7	0001	R 26	L	12	3	10001-06	5
		27	10100217			R MF 9.09K	010	E	7	0001	R 27	L	12	3	10001-06	5
		27	10100220			R MF 499	010	E	7	0001	R 28	L	12	3	10001-06	5
		27	10100221			R CARB 1.5K	010	E	7	0001	R 39	L	12	3	10001-06	5
		27	10100222			R CARB 8.2K	020	E	7	0001	R 44, 54	L	12	3	10001-06	5
		27	10100223			R CARB 11K	010	E	7	0001	R 45	L	12	3	10001-06	5
		27	10100224			R CARB 470K	010	E	7	0001	R 47	L	12	3	10001-06	5
		27	10100225			R CARB 33K	010	E	7	0001	R 48	L	12	3	10001-06	5
		27	10100226			R CARB 750	010	E	7	0001	R 50	L	12	3	10001-06	5
		27	10100227			R CARB 2.4K	010	E	7	0001	R 51	L	12	3	10001-06	5
		27	10100228			R CARB 56K	020	E	7	0001	R 35, 53	L	12	3	10001-06	5
		27	10100229			R CARB 3.9K	020	E	7	0001	R 6, 55	L	12	3	10001-06	5
		27	10100230			R CARB 47K	010	E	7	0001	R 57	L	12	3	10001-06	5

INTEGRA INC
ENGINEERING PARTS LIST

ASSEMBLY # A210001-06
USED ON MSG-2106
NEXT ASSEMBLY A110222-03
TITLE SWEEP GENERATOR BOARD

DATE RELEASED _____

1 2 TC	DATE	7 CC	9 PART NUMBER	17 SUFF	18 REV	19 DESCRIPTION	40 QUA	43 U/M	44 SRC	45 E/F	REF DESIGNATION	63 M	64 T/P	70 L	71 NEXT ASSY	80 C
		27	10100231			R CARB 1.1K	010	E	7	0001	R 58	L	12	3	10001-06	5
		27	10100269			R CARB 3.3K	010	E	7	0001	R 8	L	12	3	10001-06	5
		27	10100295			R MF 1.10K	010	E	7	0001	R 29	L	12	3	10001-06	5
		27	10100296			R MF 1.30K	020	E	7	0001	R 13, 25	L	12	3	10001-06	5
		27	10100302			R CARB 51K	010	E	7	0001	R 59	L	12	3	10001-06	5
		27	10100304			R CARB 1K	010	E	7	0001	R 38	L	12	3	10001-06	5
		27	10100310			R CARB 15K	030	E	7	0001	R 2,52, 56	L	12	3	10001-06	5
		27	10100313			R CARB 2.7	020	E	7	0001	R 66, 67	L	12	3	10001-06	5
		27	10100465			R CARB 1	010	E	7	0001	R 61	L	12	3	10001-06	5
		27	10101333			R CARB 300K	010	E	7	0001	R 3	L	12	3	10001-06	5
		30	10100092			TRANS, 2N4124	110	E	7	0001	Q 4-8,10-15	L	12	3	10001-06	5
		30	10100095			TRANS, 2N4126	030	E	7	0001	Q 1, 3, 9	L	12	3	10001-06	5
		30	10100121			TRANS, 2N3569	010	E	7	0001	Q 16	L	12	3	10001-06	5
		30	10100129			TRANS, KE4391	010	E	7	0001	Q 2	L	12	3	10001-06	5
		41	10100084			SOCKET, 14 PIN	020	E	7	0001		L	12	3	10001-06	5
		41	10100128			SOCKET, 16 PIN	030	E	7	0001		L	12	3	10001-06	5

ORIGINAL

INTEGRA INC
ENGINEERING PARTS LIST

ASSEMBLY # A210204-04
USED ON MSG-2106
NEXT ASSEMBLY A210222-03
TITLE DUAL FUNCTION CONTROL BOARD

DATE RELEASED _____

1 2 TC	DATE	7 9 CC	PART NUMBER	17 18 SUFF	REV	19 DESCRIPTION	40 QUA	43 U/M	44 SRC	45 E/F	REF DESIGNATION	63 M	64 T/P	70 L	71 NEXT ASSY	80 C
		A2	10204-04			DFC BD	010	E	C	0001		L	13	2	10222-03	5
		13	10100088			C CER .01 UF	130	E	7	0001	C 1,6-15,17,18	L	13	3	10204-04	5
		13	10100881			C FILM .015 UF	010	E	7	0001	C 16	L	13	3	10204-04	5
		13	10101900			C ELEC 10 UF	040	E	7	0001	C 2-5	L	13	3	10204-04	5
		15	10100183			DIODE, IN4148 /N5240B	010	E	7	0001	CR 1	L	13	3	10204-04	5
		19	10100116			IC, LM307CN	030	E	7	0001	IC 1,2,3	L	13	3	10204-04	5
		19	10100709			IC, LM348N	030	E	7	0001	IC 4,5,6	L	13	3	10204-04	5
		19	10100741			IC, REF-01CJ	010	E	7	0001	IC 8	L	13	3	10204-04	5
		19	10100114			IC, LM741CN	010	E	7	0001	IC 9	L	13	3	10204-04	5
		25	10101116			PCB	010	E	7	0001		L	13	3	10204-04	5
		27	10100107			R MF 100	010	E	7	0001	R 43	L	13	3	10204-04	5
		27	10100187			R MF 1K	020	E	7	0001	R 36,37	L	13	3	10204-04	5
		27	10100189			R MF 3.57K	010	E	7	0001	R 85	L	13	3	10204-04	5
		27	10100230			R CARB 47K	010	E	7	0001	R 47	L	13	3	10204-04	5
		27	10100267			R MF 2.49K	030	E	7	0001	R 10,26,29	L	13	3	10204-04	5
		27	10100286			R MF 20.0K	010	E	7	0001	R 62	L	13	3	10204-04	5
		27	10100289			R MF 10.0K	090	E	7	0001	R 3,6,7,15,19, 20,28,56,80	L	13	3	10204-04	5
		27	10100290			R MF 4.99K	070	E	7	0001	R 8,9,12,18,21, 24,53	L	13	3	10204-04	5
		27	10100291			R MF 9.53K	040	E	7	0001	R 2, 5, 14, 16	L	13	3	10204-04	5
		27	10100293			R MF 5.11K	020	E	7	0001	R 57,42	L	13	3	10204-04	5
		27	10100294			R MF 3.32K	010	E	7	0001	R 58	L	13	3	10204-04	5
		27	10100302			R CARB 51K	010	E	7	0001	R 22	L	13	3	10204-04	5
		27	10100303			R CARB 510K	010	E	7	0001	R 23	L	13	3	10204-04	5
		27	10100304			R CARB 1K	040	E	7	0001	R 30,44,45,48	L	13	3	10204-04	5
		27	10100306			R CARB 620K	010	E	7	0001	R 55	L	13	3	10204-04	5
		27	10100309			R CARB 100K	010	E	7	0001	R 46	L	13	3	10204-04	5
		27	10100311			R MF 1M	010	E	7	0001	R 84	L	13	3	10204-04	5
		27	10100313			R CARB 2.7	020	E	7	0001	R 63, 64	L	13	3	10204-04	5
		27	10100436			R MF 49.9K	020	E	7	0001	R 31,38	L	13	3	10204-04	5
		27	10100439			R MF 24.9K	020	E	7	0001	R 11,66	L	13	3	10204-04	5
		27	10100478			R CARB 15K	020	E	7	0001	R 32, 34	L	13	3	10204-04	5
		27	10100597			R MF 33.2K	010	E	7	0001	R 61	L	13	3	10204-04	5
		27	10100599			R MF 100K	020	E	7	0001	R 40,83	L	13	3	10204-04	5
		27	10100610			R MF 1K	010	E	7	0001	R 65	L	13	3	10204-04	5
		27	10100820			R MF 200K	010	E	7	0001	R 25	L	13	3	10204-04	5
		27	10101088			R MF 19.1K	010	E	7	0001	R 52	L	13	3	10204-04	5
		27	10101281			R MF 21.5K	010	E	7	0001	R 86	L	13	3	10204-04	5
		27	10101384			R CARB 6.2M	010	E	7	0001	R 54	L	13	3	10204-04	5
		27	10101385			R MF 20.0K 1%	020	E	7	0001	R 79,81	L	13	3	10204-04	5
		27	10101407			R MF 154K	010	E	7	0001	R 39	L	13	3	10204-04	5

ORIGINAL

INTEGRA INC
ENGINEERING PARTS LIST

ASSEMBLY # A210204-04
USED ON MSG-2106
NEXT ASSEMBLY A210222-03
TITLE DUAL FUNCTION CONTROL BOARD

DATE RELEASED

1 2 TC	DATE	7 9 CC	PART NUMBER	17 SUFF	18 REV	19 DESCRIPTION	40 QUA	43 U/M	44 SRC	45 E/F	REF DESIGNATION	63 M	64 T/P	70 L	71 NEXT ASSY	80 C
		28	10100316			R VAR 1K 10T	060	E	7	0001	R 1,4,13,17,27,59	L	13	3	10204-04	5
		28	10100317			R VAR 2K 10T	010	E	7	0001	R 51	L	13	3	10204-04	5
		28	10100319			R VAR 10K 10T	050	E	7	0001	R 33,35,60,78,82	L	13	3	10204-04	5
		28	10100320			R VAR 20K	010	E	7	0001	R 41	L	13	3	10204-04	5
		30	10100196			TRANS, 2N5401	020	E	7	0001	Q 1,2	L	13	3	10204-04	5
		30	10100233			TRANS, 2N4930	010	E	7	0001	Q 3	L	13	3	10204-04	5
		41	10100084			SOCKET, 14 PIN	030	E	7	0001		L	13	3	10204-04	5
		41	10100128			SOCKET, 16 PIN	030	E	7	0001		L	13	3	10204-04	5

INTEGRA INC
ENGINEERING PARTS LIST

ASSEMBLY # A210203-05
USED ON MSG-2106
NEXT ASSEMBLY A110222-03
TITLE DISPLAY PROCESSOR BOARD

ORIGINAL

DATE RELEASED _____

1 2 TC DATE	7 9 CC PART NUMBER	17 18 SUFF REV	19 DESCRIPTION	40 QUA	43 U/M	44 SRC	45 E/F	REF DESIGNATION	63 M	64 T/P	70 L	71 NEXT ASSY	80 C
	A2 10203-05		DISP PROC BD	010	E	C	0001		L	14	2	10222-03	5
	13 10100088		C DISC .01UF	220	E	7	0001	C 2,4,6,8,10-16 19,20,23,24-26	L	14	3	10203-05	5
	13 10100544		C CER .001UF	010	E	7	0001	C 38	L	14	3	10203-05	5
	13 10100879		C FILM .001UF	030	E	7	001	C 21,22,27	L	14	3	10203-05	5
	13 10100991		C FILM .0047UF	050	E	7	0001	C 1,3,5,7,9	L	14	3	10203-05	5
	13 10101900		C ELEC 10UF	050	E	7	0001	C 28-32	L	14	3	10203-05	5
	19 10100114		IC, LM741CN	030	E	7	0001	IC 11-13	L	14	3	10203-05	5
	19 10100458		IC, SN74123N	020	E	7	0001	IC 16, 17	L	14	3	10203-05	5
	19 10100709		IC, LM348N	010	E	7	0001	IC 7	L	14	3	10203-05	5
	19 10101043		IC, IM5010CPD	030	E	7	0001	IC 8-10	L	14	3	10203-05	5
	19 10101083		IC, SMP81FY	050	E	7	0001	IC 1-5	L	14	3	10203-05	5
	19 10101095		IC, SSS7510-FQ	010	E	7	0001	IC 6	L	14	3	10203-05	5
	19 10101125		IC, SN74L10	010	E	7	0001	IC 14	L	14	3	10203-05	5
	19 10101256		IC, LM311N	030	E	7	0001	IC 18, 19, 20	L	14	3	10203-05	5
	25 10101124		PCB	010	E	7	0001		L	14	3	10203-05	5
	27 10100091		R CARB 200K	030	E	7	0001	R 45,50,55	L	14	3	10203-05	5
	27 10100192		R CARB 2K	030	E	7	0001	R 64-66					
	27 10100225		R CARB 33K	030	E	7	0001	R 49,54,59	L	14	3	10203-05	5
	27 10100289		R MF 10.0K	030	E	7	0001	R 19,37,40	L	14	3	10203-05	5
	27 10100304		R CARB 1K	080	E	7	0001	R 46,47,51,52,56, 57,62,63	L	14	3	10203-05	5
	27 10100313		R CARB 2.7K	020	E	7	0001	R 60,61	L	14	3	10203-05	5
	27 10100465		R CARB 1	030	E	7	0001	R 48,53,58	L	14	3	10203-05	5
	27 10100821		R MF 66.5K(matched)	090	E	7	0001	R 22-24,27-29,32-34	L	14	3	10203-05	5
	27 10101018		R MF 499K	030	E	7	0001	R 21,26,31	L	14	3	10203-05	5
	27 10101386		R MF 10.0K .1%	010	E	7	0001	R 12	L	14	3	10203-05	5
	27 10101385		R MF 20.0K .1%	120	E	7	0001	R 6-11, 13-18	L	14	3	10203-05	5
	28 10100317		R VAR 2K	030	E	7	0001	R 35,38,41	L	14	3	10203-05	5
	28 10100319		R VAR 10K 15T	030	E	7	0001	R 36,39,42	L	14	3	10203-05	5
	28 10100322		R VAR 100K	080	E	7	0001	R 1-5,20,25,30	L	14	3	10203-05	5
	41 10100084		SOCKET, 14 PIN	100	E	7	0001		L	14	3	10203-05	5
	41 10100124		SOCKET, 8 PIN	060	E	7	0001		L	14	3	10203-05	5
	41 10100128		SOCKET, 16 PIN	030	E	7	0001		L	14	3	10203-05	5

ORIGINAL

INTEGRA INC
ENGINEERING PARTS LIST

ASSEMBLY # A210206-03
USED ON MSG-2106
NEXT ASSEMBLY A110222-03
TITLE BIAS BOARD

DATE RELEASED _____

1 2 TC DATE	7 9 CC PART NUMBER	17 18 SUFF REV	19 DESCRIPTION	40 QUA	43 U/M	44 SRC	45 E/F	REF DESIGNATION	63 64 M T/P	70 L	71 NEXT ASSY	80 C
	A2 10206-03		BIAS BOARD	010	E	C	0001		L 15	2	10222-10	5
	13 10100088		C, DISC .01UF	120	E	7	0001	C 1,2,5,6,8-13, 15,16	L 15	3	10206-03	5
	13 10100979		C MICA 30 PF	010	E	7	0001	C 7	L 15	3	10206-03	5
	13 10101900		C, ELEC 10UF	070	E	7	0001	C 3,9,18-21,22	L 15	3	10206-03	5
	15 10100019		DIODE, 2N4148	020	E	7	0001	CR 1,2,3,4	L 15	3	10206-03	5
	19 10100096		IC, SN7400N	010	E	7	0001	IC 10	L 15	3	10206-03	5
	19 10100114		IC, LM741CN	020	E	7	0001	IC 1,2	L 15	3	10206-03	5
	19 10100116		IC, LM307CN	020	E	7	0001	IC 11	L 15	3	10206-03	5
	19 10100120		IC, LM301AN	010	E	7	0001	IC 3	L 15	3	10206-03	5
	19 10100709		IC, LM348N	020	E	7	0001	IC 5,6	L 15	3	10206-03	5
	19 10101129		IC, LM320MP-5.0	010	E	7	0001	IC 4	L 15	3	10206-03	5
	25 10101128		P.C.B.	010	E	7	0001		L 15	3	10206-03	5
	27 10100102		R CARB 10	030	E	7	0001	R 7, 17,18	L 15	3	10206-03	5
	27 10100107		R CARB 100	030	E	7	0001	R 6,25,28	L 15	3	10206-03	5
	27 10100110		R CARB 10K	030	E	7	0001	R 77	L 15	3	10206-03	5
	27 10100300		R CARB 5.1K	010	E	7	0001	R 16	L 15	3	10206-03	5
	27 10100310		R CARB 15K	010	E	7	0001	R 22	L 15	3	10206-03	5
	27 10100313		R CARB 2.7	020	E	7	0001	R 74,75	L 15	3	10206-03	5
	27 10100436		R MF 49.9K	020	E	7	0001	R 2	L 15	3	10206-03	5
	27 10100581		R MF 1.24K	010	E	7	0001	R 8	L 15	3	10206-03	5
	27 10100585		R MF 39.2K	010	E	7	0001	R 1	L 15	3	10206-03	5
	27 10100954		R MF 20.0K	080	E	7	0001	R 23,24,26,27, 29,42-44	L 15	3	10206-03	5
	27 10101132		R MF 3.92 K	010	E	7	0001	R 9	L 15	3	10206-03	5
	28 10100319		R VAR 10K	040	E	7	0001	R 4,5	L 15	3	10206-03	5
	28 10100320		L VAR 20K	020	E	7	0001	R 3	L 15	3	10206-03	5
	30 10100014		TRANS, 2N2905A	010	E	7	0001	Q 2	L 15	3	10206-03	5
	30 10100890		TRANS, 2N2219	010	E	7	0001	Q 1	L 15	3	10206-03	5
	41 10100084		SOCKET 14 PIN	020	E	7	0001		L 15	3	10206-03	5
	41 10100128		SOCKET 16 PIN	030	E	7	0001		L 15	3	10206-03	5

INTEGRA INC
ENGINEERING PARTS LIST

ASSEMBLY # A210213-01
USED ON MSG-2160
NEXT ASSEMBLY A110222-03
TITLE SIGNAL PROCESSOR BOARD

ORIGINAL

DATE RELEASED _____

1 2 TC	7 DATE	9 CC	PART NUMBER	17 SUFF	18 REV	19 DESCRIPTION	40 QUA	43 U/M	44 SRC	45 E/F	REF DESIGNATION	63 M	64 T/P	70 L	71 NEXT ASSY	80 C
		A2	10213-01			SIGNAL PROC BD	010	E	7	0001		L	16	2	10222-03	5
		13	10100879			C FILM .001 UF	020	E	7	0001	C 1,2	L	16	3	10213-01	5
		13	10101900			C ELEC 10 UF	050	E	7	0001	C 3-7	L	16	3	10213-01	5
		15	10100019			DIODE, IN4148	140	E	7	0001	CR 1-14	L	16	3	10213-01	5
		19	10100096			IC, SN7400N	010	E	7	0001	IC 6	L	16	3	10213-01	5
		19	10100204			IC, SN7404N	010	E	7	0001	IC 1	L	16	3	10213-01	5
		19	10100212			IC, SN7417N	010	E	7	0001	IC 2	L	16	3	10213-01	5
		19	10100361			IC, LM340-5T	010	E	7	0001	IC 3	L	16	3	10213-01	5
		19	10100458			IC, SN74123N	010	E	7	0001	IC 5	L	16	3	10213-01	5
		25	10101154			PCB	010	E	7	0001		L	16	3	10213-01	5
		27	10100101			R CARB 150	020	E	7	0001	R 6,18	L	16	3	10213-01	5
		27	10100105			R CARB 5.6K	010	E	7	0001	R 19	L	16	3	10213-01	5
		27	10100225			R CARB 33K	020	E	7	0001	R 13,14	L	16	3	10213-01	5
		27	10100304			R CARB 1K	010	E	7	0001	R 15	L	16	3	10213-01	5
		27	10100313			R CARB 2.7	020	E	7	0001	R 16,17	L	16	3	10213-01	5
		27	10100743			R CARB 510	110	E	7	0001	R 1-5, 7-12	L	16	3	10213-01	5
		41	10100084			SOCKET,14 PIN	030	E	7	0001		L	16	3	10213-01	5
		41	10100128			SOCKET, 16 PIN	010	E	7	0001		L	16	3	10213-01	5

1 2 TC	7 DATE	9 CC	PART NUMBER	17 SUFF	18 REV	19 DESCRIPTION	40 QUA	43 U/M	44 SRC	45 E/F	REF DESIGNATION	63 M	64 T/P	70 L	71 NEXT ASSY	80 C
		A2	10233-01			LEVELING BD	010	E	C	0001			17	2	10222-03	5
		13	10100088			C CER .01 UF	140	E	7	0001	C 4,5-8,11,12,16 20,21,23-26		17	3	10233-01	5
		13	10100433			C MICA 150 PF	020	E	7	0001	C 14,17		17	3	10233-01	5
		13	10100434			C MICA 91 PF	010	E	7	0001	C 34		17	3	10233-01	5
		13	10100553			C TANT 2.2 UF	010	E	7	0001	C 15		17	3	10233-01	5
		13	10100160			C FILM .033 UF	010	E	7	0001	C 35		17	3	10233-01	5
		13	10100879			C FILM .001 UF	010	E	7	0001	C 19		17	3	10233-01	5
		13	10100899			C MICA SAT	020	E	7	0001	C 9,18		17	3	10233-01	5
		13	10100952			C MICA 2 PF	010	E	7	0001	C 2		17	3	10233-01	5
		13	10100964			C MICA 10 PF	010	E	7	0001	C 33		17	3	10233-01	5
		13	10100968			C MICA 24 PF	030	E	7	0001	C 3,10,22		17	3	10233-01	5
		13	10100973			C MICA 36 PF	010	E	7	0001	C 27		17	3	10233-01	5
		13	10101900			C ELEC 10 UF	060	E	7	0001	C 13,28-32		17	3	10233-01	5
		13	10101901			C ELEC 1 UF	010	E	7	0001	C 1		17	3	10233-01	5
		15	10100016			DIODE, IN 5231A	010	E	7	0001	CR 22		17	3	10233-01	5
		15	10100019			DIODE, IN 4148	190	E	7	0001	CR 1,2,4-6, 9-20,23,24		17	3	10233-01	5
		15	10100183			DIODE, IN 5240	010	E	7	0001	CR 3		17	3	10233-01	5
		15	10100435			DIODE, IN 821	010	E	7	0001	CR 21		17	3	10233-01	5
		19	10100120			IC, LM 301AN	020	E	7	0001	IC 6,8		17	3	10233-01	5
		19	10100565			IC, CA 3100	040	E	7	0001	IC 1-4		17	3	10233-01	5
		19	10100709			IC, LM 348N	010	E	7	0001	IC 7		17	3	10233-01	5
		19	10101256			IC, LM 311N	010	E	7	0001	IC 5		17	3	10233-01	5
		21	10100808			CONN	010	E	7	0001	J 1		17	3	10233-01	5
		25	10101243			PCB	010	E	7	0001			17	3	10233-01	5
		27	10100102			R CARB 10	010	E	7	0001	R 53		17	3	10233-01	5
		27	10100107			R CARB 100	030	E	7	0001	R 45,49,86		17	3	10233-01	5
		27	10100110			R CARB 10K	010	E	7	0001	R 41		17	3	10233-01	5
		27	10100187			R MF 1.00K	090	E	7	0001	R 4,5,26,33, 40,80,81,90,103		17	3	10233-01	5
		27	10100192			R CARB 2K	020	E	7	0001	R 84,98		17	3	10233-01	5
		27	10100221			R CARB 1.5K	010	E	7	0001	R 44		17	3	10233-01	5
		27	10100234			R CARB 6.8K	010	E	7	0001	R 32		17	3	10233-01	5
		27	10100269			R CARB 3.3K	010	E	7	0001	R 47		17	3	10233-01	5
		27	10100286			R MF 20.0K	010	E	7	0001	R 35		17	3	10233-01	5
		27	10100288			R MF 14.7K	010	E	7	0001	R 75		17	3	10233-01	5
		27	10100289			R MF 10.0K	080	E	7	0001	R 18,20,21,39, 43,59,76,77		17	3	10233-01	5
		27	10100293			R MF 5.11K	100	E	7	0001	R 14,17,22,48,50,55 57,63,65,79		17	3	10233-01	5
		27	10100302			R CARB 51K	010	E	7	0001	R 70		17	3	10233-01	5
		27	10100313			R CARB 2.7	020	E	7	0001	R 99,100		17	3	10233-01	5
		27	10100367			R CARB 13K	010	E	7	0001	R 46		17	3	10233-01	5

INTEGRA INC
ENGINEERING PARTS LIST

ASSEMBLY # A210233-01
USED ON MSG-2106
NEXT ASSEMBLY A110222-03
TITLE LEVELING BOARD

DATE RELEASED _____

1 2 TC	DATE	7 9 CC	PART NUMBER	17 SUFF	18 REV	19 DESCRIPTION	40 QUA	43 U/M	44 SRC	45 E/F	REF DESIGNATION	63 M	64 T/P	70 L	71 NEXT ASSY	80 C
		27	10100397			R CARB 180	010	E	7	0001	R 52	L	17	3	10233-01	5
		27	10100409			R CARB 24K	020	E	7	0001	R 66,102	L	17	3	10233-01	5
		27	10100465			R CARB 1	010	E	7	0001	R 38	L	17	3	10233-01	5
		27	10100590			R MF 12.7K	010	E	7	0001	R 34	L	17	3	10233-01	5
		27	10100599			R MF 100K	080	E	7	0001	R 11-13,69,82, 89,94,101	L	17	3	10233-01	5
		27	10100607			R MF 150K	030	E	7	0001	R 30,64,97	L	17	3	10233-01	5
		27	10100609			R MF 1M	010	E	7	0001	R 95	L	17	3	10233-01	5
		27	10100786			R MF 825	010	E	7	0001	R 15	L	17	3	10233-01	5
		27	10101266			R MF 28.7K	010	E	7	0001	R 27	L	17	3	10233-01	5
		27	10101267			R MF 4.64K	020	E	7	0001	R 7,8	L	17	3	10233-01	5
		27	10101268			R MF 1.21K	010	E	7	0001	R 92	L	17	3	10233-01	5
		27	10101269			R MF 511	010	E	7	0001	R 19	L	17	3	10233-01	5
		27	10101270			R MF 2.61K	050	E	7	0001	R 1,2,10,28,87	L	17	3	10233-01	5
		27	10101271			R MF 26.1K	020	E	7	0001	R 6,24	L	17	3	10233-01	5
		27	10101272			R MF 215K	010	E	7	0001	R 9	L	17	3	10233-01	5
		27	10101273			R MF 38.3K	010	E	7	0001	R 3	L	17	3	10233-01	5
		27	10101274			R MF 51.1K	040	E	7	0001	R 23,58,60,83	L	17	3	10233-01	5
		27	10101275			R MF 681	010	E	7	0001	R 93	L	17	3	10233-01	5
		27	10101276			R MF 34.8K	010	E	7	0001	R 74	L	17	3	10233-01	5
		27	10101277			R MF 562	010	E	7	0001	R 37	L	17	1	10233-01	5
		27	10101278			R MF 1.96K	030	E	7	0001	R 16,42,78	L	17	3	10233-01	5
		27	10101279			R MF 31.6K	020	E	7	0001	R 54,56	L	17	3	10233-01	5
		27	10101280			R MF 42.2K	020	E	7	0001	R 71,72	L	17	3	10233-01	5
		27	10101281			R MF 21.5K	010	E	7	0001	R 51	L	17	3	10233-01	5
		27	10101431			R CARB 3.6K	010	E	7	0001	R 73	L	17	3	10233-01	5
		28	10100314			R VAR 100 15T	010	E	7	0001	R 91	L	17	3	10233-01	5
		28	10100315			R VAR 500 15T	010	E	7	0001	R 85	L	17	3	10233-01	5
		28	10100316			R VAR 1K 15T	010	E	7	0001	R 36	L	17	3	10233-01	5
		28	10100318			R VAR 5K 15T	010	E	7	0001	R 31	L	17	3	10233-01	5
		28	10100320			R VAR 20K 15T	010	E	7	0001	R 25	L	17	3	10233-01	5
		28	10100322			R VAR 100K 15T	030	E	7	0001	R 61,62,96	L	17	3	10233-01	5
		28	10100568			R VAR 1K 1T	010	E	7	0001	R 88	L	17	3	10233-01	5
		28	10101285			R VAR 200K	020	E	7	0001	R 67,68	L	17	3	10233-01	5
		30	10100092			TRANS, 2N4124	070	E	7	0001	Q 11,14-17,20,21	L	17	3	10233-01	5
		30	10100095			TRANS, 2N4126	020	E	7	0001	Q 10,12	L	17	3	10233-01	5
		30	10100129			TRANS, KE4391	110	E	7	0001	Q 1-9,18,19	L	17	3	10233-01	5
		30	10100890			TRANS, 2N2219	010	E	7	0001	Q 13	L	17	3	10233-01	5
		41	10100084			SOCKET 14 PIN	010	E	7	0001		L	17	3	10233-01	5
		41	10100124			SOCKET 8 PIN	060	E	7	0001		L	17	3	10233-01	5
		41	10100128			SOCKET 16 PIN	010	E	7	0001		L	17	3	10233-01	5
		41	10100172			SWITCH	010	E	7	0001	S 1	L	17	3	10233-01	5

INTEGRA INC
ENGINEERING PARTS LIST

ASSEMBLY # A210135-04
USED ON MSG-2106
NEXT ASSEMBLY A210222-03
TITLE TRIPLE YIG DRIVER BOARD

ORIGINAL

DATE RELEASED

1 2 TC DATE	7 9 CC PART NUMBER	17 18 SUFF REV	19 DESCRIPTION	40 QUA	43 U/M	44 SRC	45 E/F	REF DESIGNATION	63 M	64 T/P	70 L	71 NEXT ASSY	80 C
	A2 10135-04		TRIP YIG BD	010	E	C	0001	001	L	18	2	10222-03	5
	13 10100088		C CER .01 UF	090	E	7	0001	C 2,3,6,8,9,12, 14,15,18	L	18	3	10135-04	5
	13 10100160		C FILM .033 UF	020	E	7	0001	C 5,10	L	18	3	10135-04	5
	13 10101900		C ELEC 10 UF	040	E	7	0001	C 19-22	L	18	3	10135-04	5
	13 10100537		C MICA 390 PF	030	E	7	0001	C 23,24,25	L	18	3	10135-04	5
	13 10100544		C CER .001 UF	030	E	7	0001	C 1,7,13	L	18	3	10135-04	5
	13 10100881		C FILM .015 UF	010	E	7	0001	C 4	L	18	3	10135-04	5
	15 10100019		DIODE, IN4148	030	E	7	0001	CR 4,5,6	L	18	3	10135-04	5
	19 10100116		IC, LM307CN	030	E	7	0001	IC 1,3,5	L	18	3	10135-04	5
	19 10100120		IC, LM301AN	030	E	7	0001	IC 2,4,6	L	18	3	10135-04	5
	25 10100775		PCB	010	E	7	0001		L	18	3	10135-04	5
	27 10100110		R CARB 10K	030	E	7	0001	R 23,49,73	L	18	3	10135-04	5
	27 10100267		R MF 2.49K	010	E	7	0001	R 67	L	18	3	10135-04	5
	27 10100286		R MF 20.0 K	040	E	7	0001	R 15,79,85,87	L	18	3	10135-04	5
	27 10100289		R MF 10.0 K	010	E	7	0001	R 42	L	18	3	10135-04	5
	27 10100292		R MF 24.3K	010	E	7	0001	R 82	L	18	3	10135-04	5
	27 10100304		R CARB 1K	120	E	7	0001	R 19-21,24,45-47, 50,69-71,74	L	18	3	10135-04	5
	27 10100309		R CARB 100K	030	E	7	0001	R 22,48,72	L	18	3	10135-04	5
	27 10100313		R CARB 2.7	020	E	7	0001	R 75,76	L	18	3	10135-04	5
	27 10100436		R MF 49.9K	030	E	7	0001	R 4,29,54	L	18	3	101q>-04	5
	27 10100439		R MF 24.9K	010	E	7	0001	R 80	L	18	3	10135-04	5
	27 10100482		R MF 6.04K	020	E	7	0001	R 37,65	L	18	3	10135-04	5
	27 10100580		R MF 6.65K	010	E	7	0001	R 88	L	18	3	10135-04	5
	27 10100582		R MF 14.3K	010	E	7	0001	R 83	L	18	3	10135-04	5
	27 10100589		R MF 15.8K	010	E	7	0001	R 89	L	18	3	10135-04	5
	27 10100590		R MF 12.7K	030	E	7	0001	R 2,27,52	L	18	3	10135-04	5
	27 10100595		R MF 10	010	E	7	0001	R 78	L	18	3	10135-04	5
	27 10100604		R MF 11.0K	010	E	7	0001	R 17	L	18	3	10135-04	5
	27 10100608		R MF 5.62 K	010	E	7	0001	R 77	L	18	3	10135-04	5
	27 10100820		R MF 200K	010	E	7	0001	R 81	L	18	3	10135-04	5
	27 10100953		R MF 4.99K	030	E	7	0001	R 43,84,86	L	18	3	10135-04	5
	27 10101018		R MF 499K	030	E	7	0001	R 7,32,57	L	18	3	10135-04	5
	27 10101133		R MF 27.4 K	010	E	7	0001	R 16	L	18	3	10135-04	5
	27 10101402		R MF 110K	030	E	7	0001	R 5,30,55	L	18	3	10135-04	5
	28 10100316		R VAR 1K, 10T	010	E	7	0001	R 68	L	18	3	10135-04	5
	28 10100317		R VAR 2K, 10T	020	E	7	0001	R 18,44	L	18	3	10135-04	5
	28 10100322		R VAR 100K	060	E	7	0001	R 3,6,28,31,53,56	L	18	3	10135-04	5
	30 10100196		TRANS, 2N5401	060	E	7	0001	Q 1,2,4,5,7,8	L	18	3	10135-04	5
	30 10100233		TRANS, 2N4930	030	E	7	0001	Q 3,6,9	L	18	3	10135-04	5
	41 10100128		SOCKET 16 PIN	030	E	7	0001		L	18	3	10135-04	5

ORIGINAL

INTEGRA INC
ENGINEERING PARTS LIST

ASSEMBLY # A210165-03
USED ON MSG-2106
NEXT ASSEMBLY A110222-03
TITLE RANGE SELECTOR BOARD

DATE RELEASED _____

1 2 TC	DATE	7 9 CC	PART NUMBER	17 SUFF	18 REV	19 DESCRIPTION	40 QUA	43 U/M	44 SRC	45 E/F	REF DESIGNATION	63 M	64 T/P	70 L	71 NEXT ASSY	80 C
		A2	10165-03			RANGE SEL BD	010	E	C	0001		L	19	2	10222-03	5
		13	10100088			C CER .01 UF	020	E	7	0001	C 27,28	L	19	3	10165-03	5
		13	10100977			C MICA 82 PF	030	E	7	0001	C 24-26	L	19	3	10165-03	5
		13	10101900			C ELEC 10 UF	060	E	7	0001	C 7,14-18	L	19	3	10165-03	5
		17	10100130			LED	040	E	7	0001	DS 1-4	L	19	3	10165-03	5
		19	10100205			IC, SN7405N	010	E	7	0001	IC 6	L	19	3	10165-03	5
		19	10100362			IC, LM339N	010	E	7	0001	IC 3	L	19	3	10165-03	5
		19	10101328			IC, SN7486N	010	E	7	0001	IC 5	L	19	3	10165-03	5
		25	10101387			PCB	010	E	7	0001		L	19	3	10165-03	5
		27	10100105			R CARB 5.6K	040	E	7	0001	R 15,20,25,30	L	19	3	10165-03	5
		27	10100106			R CARB 220	040	E	7	0001	R 81-84	L	19	3	10165-03	5
		27	10100107			R CARB 100	040	E	7	0001	R 97-100	L	19	3	10165-03	5
		27	10100110			R CARB 10K	150	E	7	0001	R 16,18,21,23,26, 28,31,35,36	L	19	3	10165-03	5
		27	10100217			R MF 9.09 K	010	E	7	0001	R 93	L	19	3	10165-03	5
		27	10100220			R MF 499 K	010	E	7	0001	R 92	L	19	3	10165-03	5
		27	10100225			R CARB 33K	040	E	7	0001	R 34,44,54,64	L	19	3	10165-03	5
		27	10100229			R CARB 3.9K	082	E	7	0001	R 33,39,43,49, 53,59,63,69	L	19	3	10165-03	5
		27	10100288			R MF 14.7 K	010	E	7	0001	R 91	L	19	3	10165-03	5
		27	10100295			R MF 1.10K	010	E	7	0001	R 11	L	19	3	10165-03	5
		27	10100304			R CARB 1K	080	E	7	0001	R 32,38,42,48, 52,58,62,68	L	19	3	10165-03	5
		27	10100311			R CARB 1M	030	E	7	0001	R 19,24,29	L	19	3	10165-03	5
		27	10100313			R CARB 2.7K	060	E	7	0001	R 40,50,60,70,79,80	L	19	3	10165-03	5
		27	10100445			R MF 5.90 K	010	E	7	0001	R 94	L	19	3	10165-03	5
		27	10100590			R MF 12.7 K	010	E	7	0001	R 96	L	19	3	10165-03	5
		27	10100602			R MF 3.01 K	010	E	7	0001	R 95	L	19	3	10165-03	5
		28	10100318			R VAR 5 K	030	E	7	0001	R 17,22,27	L	19	3	10165-03	5
		30	10100092			TRANS, 2N4124	120	E	7	0001	Q 1-4,10,15,20, 25,29-32	L	19	3	10165-03	5
		30	10100095			TRANS, 2N4126	080	E	7	0001	Q 9,12,14,17,19, 22,24,37	L	19	3	10165-03	5
		41	10100084			SOCKET, 14 PIN	030	E	7	0001		L	19	3	10165-03	5

ORIGINAL

INTEGRA INC
ENGINEERING PARTS LIST

ASSEMBLY # A110223-01
USED ON MSG-2106
NEXT ASSEMBLY A010194-03
TITLE PANEL, SIDE LEFT

DATE RELEASED _____

1 2 TC	DATE	7 9 CC	PART NUMBER	17 SUFF	18 REV	19 DESCRIPTION	40 QUA	43 U/M	44 SRC	45 E/F	REF DESIGNATION	63 M	64 T/P	70 L	71 NEXT ASSY	80 C
		A1	10223-01			PANEL, SIDE LT	010	E	C	0001		L	20	1	10194-03	5
		41	10100326			CASTING, CNR FT	010	E	7	0001		L	20	2	10223-01	5
		41	10101062			EXTRU, SIDE	020	E	7	0001		L	20	2	10223-01	5
		41	10101226			PLATE, STRU SID	010	E	7	0001		L	20	2	10101223	5
		42	10007-03			SCREW, #6-3/8	020	E	7	0001		L	20	2	10223-01	5
		42	10100331			NUT, CLIP	020	E	7	0001		L	20	2	10223-01	5
		42	10100332			NUT, CLIP	020	E	7	0001		L	20	2	10223-01	5
		42	10100333			NUT, CLIP	020	E	7	0001		L	20	2	10223-01	5
		42	10100334			NUT, HEX #8	040	E	7	0001		L	20	2	10223-01	5
		42	10100335			SCREW, SPOTWELD	040	E	7	0001		L	20	2	10223-01	5
		72	10101228			PLATE, SIDE LF	010	E	3	0001		L	20	2	10223-01	5

INTEGRA INC
ENGINEERING PARTS LIST

ASSEMBLY # A110224-03
USED ON MSG-2106
NEXT ASSEMBLY A010194-03
TITLE PANEL, SIDE RIGHT

ORIGINAL

DATE RELEASED

1 2 TC	DATE	7 9 CC	PART NUMBER	17 SUFF	18 REV	19 DESCRIPTION	40 QUA	43 U/M	44 SRC	45 E/F	REF DESIGNATION	63 M	64 T/P	70 L	71 NEXT ASSY	80 C
		A1	10224-03			PANEL, SIDE RT	010	E	C	0001		L	30	1	10194-03	5
		27	10100466			R WW 3	020	E	7	0001	R 16,17	L	30	2	10224-03	5
		27	10101390			R WW 6	010	E	7	0001	R 15	L	30	2	10224-03	5
		27	10101391			R WW 12	010	E	7	0001	R 14	L	30	2	10224-03	5
		41	10100326			CASTING, CNR FT	010	E	7	0001		L	30	2	10224-03	5
		41	10100327			CASTING, CNR RE	010	E	7	0001		L	30	2	10224-03	5
		41	10101062			EXTRU, SIDE	020	E	7	0001		L	30	2	10224-03	5
		41	10101226			PLATE, STRU SD	010	E	7	0001		L	30	2	10101227	5
		42	10007-03			SCREW, #6-3/8	020	E	7	0001		L	30	2	10224-03	5
		42	10100331			NUT, CLIP	020	E	7	0001		L	30	2	10224-03	5
		42	10100332			NUT, CLIP	020	E	7	0001		L	30	2	10224-03	5
		42	10100333			NUT, CLIP	020	E	7	0001		L	30	2	10224-03	5
		42	10100334			NUT, HEX #8	040	E	7	0001		L	30	2	10224-03	5
		42	10100335			SCREW, SPOTWELD	040	E	7	0001		L	30	2	10224-03	5
		72	10101227			PLATE, SIDE RT	010	E	3	0001		L	30	2	10224-03	5

ORIGINAL

INTEGRA INC
ENGINEERING PARTS LIST

ASSEMBLY # A110225-01
USED ON MSG-2106
NEXT ASSEMBLY A010194-03
TITLE PANEL, SUB

DATE RELEASED

1 2 TC	DATE	7 9 CC	PART NUMBER	17 SUFF	18 REV	19 DESCRIPTION	40 QUA	43 U/M	44 SRC	45 E/F	REF DESIGNATION	63 M	64 T/P	70 L	71 NEXT ASSY	80 C
		A1	10225-01			PANEL, SUB	010	E	C	0001		L	40	1	10194-03	5
		28	10100010			R VAR 10K 10T	070	E	7	0001	R 1-7	L	40	2	10225-01	5
		28	10100012			R VAR 1K 1T	020	E	7	0001	R 8, 9	L	40	2	10225-01	5
		28	10101850			R VAR 5K	020	E	7	0001		L	40	2	10225-01	5
		28	10101851			R VAR 10K	010	E	7	0001		L	40	2	10225-01	5
		41	10013-02			SWITCH	010	E	7	0001	S 8	L	40	2	10225-01	5
		41	10013-03			SWITCH	010	E	7	0001	S 6	L	40	2	10225-01	5
		41	10013-04			SWITCH	010	E	7	0001	S 7	L	40	2	10225-01	5
		41	10100725			SWITCH	010	E	7	0001	S 1	L	40	2	10225-01	5
		41	10101093			SWITCH, POWER	010	E	7	0001		L	40	2	10225-01	5
		41	10101209			SPACER	020	E	7	0001		L	40	2	10225-01	5
		42	10002-02			SCREW, #2-1/4	080	E	7	0001		L	40	2	10225-01	5
		42	10002-03			SCREW, #2-3/8	020	E	7	0001		L	40	2	10225-01	5
		42	10007-03			SCREW, #6-3/8	060	E	7	0001		L	40	2	10225-01	5
		42	10100041			NUT, HEX #2	100	E	7	0001		L	40	2	10225-01	5
		43	10100037			WASHER, #2 SPL	100	E	7	0001		L	40	2	10225-01	5
		43	10100039			WASHER, #2 FL	100	E	7	0001		L	40	2	10225-01	5
		43	10100075			WASHER, #6 SPL	060	E	7	0001		L	40	2	10225-01	5
		72	10101106		B	PANEL, SUB	010	E	7	0001		L	40	2	10225-01	5

INTEGRA INC
ENGINEERING PARTS LIST

ASSEMBLY # A110226-02
USED ON MSG-2106
NEXT ASSEMBLY A010194-03
TITLE TRAY, RF

DATE RELEASED

1 2 TC	DATE	7 CC	9 PART NUMBER	17 SUFF	18 REV	19 DESCRIPTION	40 QUA	43 U/M	44 SRC	45 E/F	REF DESIGNATION	63 M	64 T/P	70 L	71 NEXT ASSY	80 C
		A1	10226-02			TRAY, RF	010	E	C	0001		L	50	1	10194-03	5
		A2	10323-01			CABLE, ASSY/RF	030	E	7	0001		L	50	2	10226-02	5
		A2	10337-01			HARNESS	010	E	S	0001		L	50	2	10226-02	5
		15	10100355			DIODE, L51A	040	E	7	0001		L	50	2	10226-02	5
		21	10100814			CONN, RF	020	E	7	0001		L	50	2	10226-02	5
		21	10101378			SWITCH	010	E	7	0001		L	50	2	10226-02	5
		21	10101478			CONN, RF, .085	020	E	7	0001		L	50	2	10226-02	5
		21	10101489			COUPLER	010	E	7	0001		L	50	2	10226-02	5
		22	10100822			DETECTOR	010	E	7	0001		L	50	2	10226-02	5
		23	10101213			OSCILLATOR	010	E	7	0001		L	50	2	10226-02	5
		23	10101214			OSC, 8-12 GHZ	010	E	7	0001		L	50	2	10226-02	5
		23	10101215			OSC, 12-18.2 GHZ	010	E	7	0001		L	50	2	10226-02	5
		23	10101250			ISOLATOR	010	E	7	0001		L	50	2	10226-02	5
		23	10101251			ISO, 12-18 GHZ	010	E	7	0001		L	50	2	10226-02	5
		23	10101252			ISO, 8-12 GHZ	010	E	7	0001		L	50	2	10226-02	5
		23	10101254			ISOLATOR	010	E	7	0001		L	50	2	10226-02	5
		23	10101263			OSCILLATOR	010	E	7	0001		L	50	2	10226-02	5
		27	10100614			R CARB 51	080	E	7	0001		L	50	2	10226-02	5
		31	10100920			CABLE, RF, COAX	050	E	7	0001		L	50	2	10226-02	5
		41	10100236			WRAP, TIE	200	E	7	0001		L	50	2	10226-02	5
		41	10101401			WRAP, TIE	010	E	7	0001		L	50	2	10226-02	5
		42	10002-03			SCREW, #2-3/8	040	E	7	0001		L	50	2	10226-02	5
		42	10002-07			SCREW, #2-7/8	020	E	7	0001		L	50	2	10226-02	5
		42	10004-04			SCREW, #4-3/8	070	E	7	0001		L	50	2	10226-02	5
		42	10004-07			SCREW, #4-7/8	010	E	7	0001		L	50	2	10226-02	5
		42	10007-03			SCREW, #6-3/8	180	E	7	0001		L	50	2	10226-02	5
		43	10100037			WASHER, #2 SPL	060	E	7	0001		L	50	2	10226-02	5
		43	10100039			WASHER, #2 FL	020	E	7	0001		L	50	2	10226-02	5
		43	10100074			WASHER, #6 FL	180	E	7	0001		L	50	2	10226-02	5
		43	10100179			WASHER, #4 FL	050	E	7	0001		L	50	2	10226-02	5
		43	10100180			WASHER, #4 SPL	080	E	7	0001		L	50	2	10226-02	5
		72	10101108	*		TRAY, RF	010	E	7	0001		L	50	2	10226-02	5
		72	10101309			BLOCK, MTNG	010	E	3	0001		L	50	2	10226-02	5
		72	10101464			BLOCK, BLANK	010	E	7	0001		L	50	2	10101309	5
		72	10101495			BRACKET, BLANK	010	E	7	0001		L	50	2	10101496	5
		72	10101496			BRACKET, MTNG	010	E	3	0001		L	50	2	10226-02	5
		72	10101510			BRACKET, MTNG	010	E	3	0001		L	50	2	10226-02	5
		72	10101563			BRACKET, BLANK	010	E	7	0001		L	50	2	10101510	5

INTEGRA INC
ENGINEERING PARTS LIST

ASSEMBLY # A110227-03
USED ON MSG-2106
NEXT ASSEMBLY A010294-03
TITLE PANEL, REAR ASSY

DATE RELEASED _____

1 2 TC	DATE	7 CC	9 PART NUMBER	17 SUFF	18 REV	19 DESCRIPTION	40 QUA	43 U/M	44 SRC	45 E/F	REF DESIGNATION	63 M	64 T/P	70 L	71 NEXT ASSY	80 C
		A1	10227-03			PANEL, REAR ASSY	010	E	C	0001		L	60	1	10194-03	5
		A2	10242-01			ADDRESS BD	010	E	S	0001		L	60	2	10227-03	5
		13	10101900			C, ELEC 10 UF	010	E	7	0001		L	60	2	10227-03	5
		13	10101901			C ELEC 1 UF	010	E	7	0001		L	60	2	10227-03	5
		15	10101633			DIODE, IN4004	020	E	7	0001		L	60	2	10227-03	5
		16	10100502			FUSE, 1 AMP	010	E	7	0001		L	60	2	10227-03	5
		19	10100045			IC, LAS1505	010	E	7	0001		L	60	2	10227-03	5
		30	10100237			TRANS, 2N6228	040	E	7	0001		L	60	2	10227-03	5
		41	10100055			SWITCH	010	E	7	0001		L	60	2	10227-03	5
		41	10100125			CONN, BNC	120	E	7	0001		L	60	2	10227-03	5
		41	10100239			HEAT SINK	030	E	7	0001		L	60	2	10227-03	5
		41	10100501			SPACER	010	E	7	0001		L	60	2	10227-03	5
		41	10100506			SPACER	040	E	7	0001		L	60	2	10227-03	5
		41	10100665			COVER	050	E	7	0001		L	60	2	10227-03	5
		41	10100892			FAN, 12V	010	E	7	0001		L	60	2	10227-03	5
		41	10101087			RECEPTACLE, AC	010	E	7	0001		L	60	2	10227-03	5
		41	10101336		A	SCREEN	010	E	7	0001		L	60	2	10227-03	5
		41	10101603			PLUG, VENT	010	E	7	0001		L	60	2	10227-03	5
		42	10004-07			SCREW, #4-7/8	020	E	7	0001		L	60	2	10227-03	5
		42	10007-04			SCREW, #6-1/2	100	E	7	0001		L	60	2	10227-03	5
		42	10100070			NUT, HEX #6	100	E	7	0001		L	60	2	10227-03	5
		42	10101097			SCREW, NYLON	010	E	7	0001		L	60	2	10227-03	5
		42	10101647			SCREW, #4-1 1/4	040	E	7	0001		L	60	2	10227-03	5
		43	10100074			WASHER, #6 FL	100	E	7	0001		L	60	2	10227-03	5
		43	10100075			WASHER, #6 SPL	100	E	7	0001		L	60	2	10227-03	5
		43	10100143			MOUNT TRANS	050	E	7	0001		L	60	2	10227-03	5
		43	10100188			INSULATOR	050	E	7	0001		L	60	2	10227-03	5
		43	10100144			LUG	060	E	7	0001		L	60	2	10227-03	5

INTEGRA INC
ENGINEERING PARTS LIST

ASSEMBLY # A110229-03
USED ON MSG-2106
NEXT ASSEMBLY A110227-03
TITLE PANEL REAR

DATE RELEASED _____

1 2 TC	DATE	7 CC	9 PART NUMBER	17 SUFF	18 REV	19 DESCRIPTION	40 QUA	43 U/M	44 SRC	45 E/F	REF DESIGNATION	63 M	64 T/P	70 L	71 NEXT ASSY	80 C
		A1	10229-03			PANEL REAR	010	E	C	0001		L	61	2	10227-03	5
		41	10100901			ALUM, BLK	960	C	7	0001		L	61	3	10101223	5
		72	10101107		C	PANEL, REAR	010	E	7	0001		L	61	3	10229-03	5
		72	10101223			LABEL, REAR	010	E	3	0001		L	61	3	10229-03	5

INTEGRA INC
ENGINEERING PARTS LIST

ASSEMBLY # A110273-03
USED ON MSG-2106 RF UNIT
NEXT ASSEMBLY A010194-03
TITLE ENCLOSURE

DATE RELEASED _____

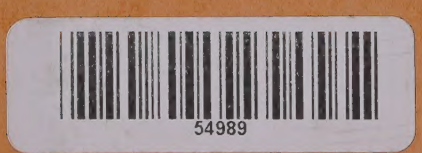
1 2 TC	DATE	7 CC	9 PART NUMBER	17 SUFF	18 REV	19 DESCRIPTION	40 QUA	43 U/M	44 SRC	45 E/F	REF DESIGNATION	63 M	64 T/P	70 L	71 NEXT ASSY	80 C
		A1	10273-03			ENCLOSURE	010	E	7	0001		L	80	1	10289-01	5

INTEGRA INC
ENGINEERING PARTS LIST

ASSEMBLY # A110230-03
USED ON MSG-2106
NEXT ASSEMBLY A110228-03
TITLE PANEL, FRONT

DATE RELEASED _____

1 2 TC	DATE	7 9 CC	PART NUMBER	17 SUFF	18 REV	19 DESCRIPTION	40 QUA	43 U/M	44 SRC	45 E/F	REF DESIGNATION	63 M	64 T/P	70 L	71 NEXT ASSY	80 C
		A1	10230-01			PANEL, FRONT	010	E	C	0001		L	71	2	10228-03	5
		41	10100901			ALUM, BLK	960	C	7	0001		L	71	3	10101210	5
		72	10101104			PANEL, FRONT	010	E	7	0001		L	71	3	10230-03	5
		72	10101210			LABEL, FRONT	010	E	3	0001		L	71	3	10230-03	5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